BUYER'S GUIDE

U.S.A. $2.50
CANADA $3.00

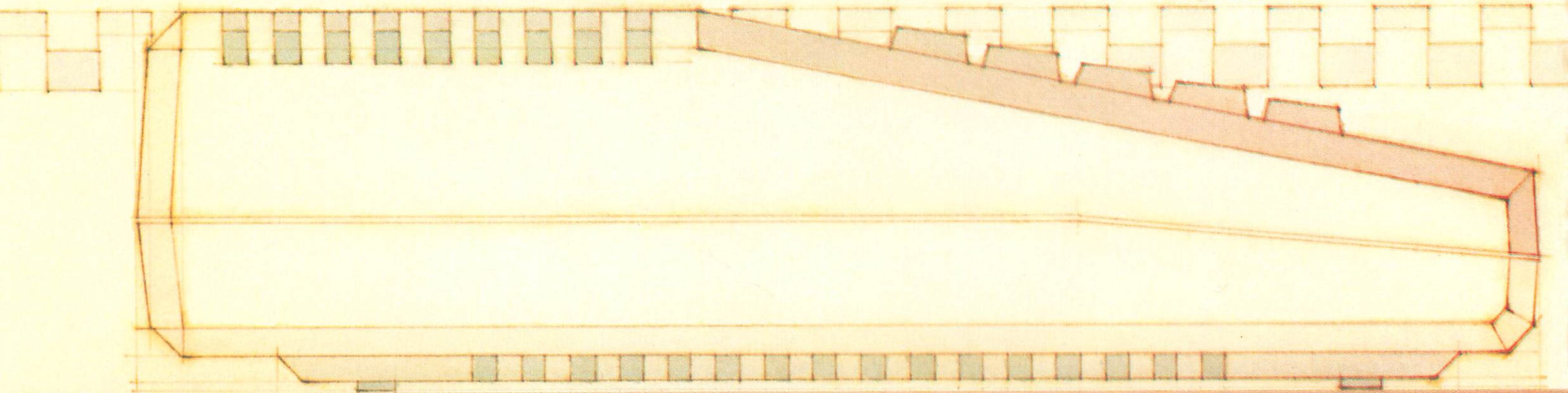
Antic™

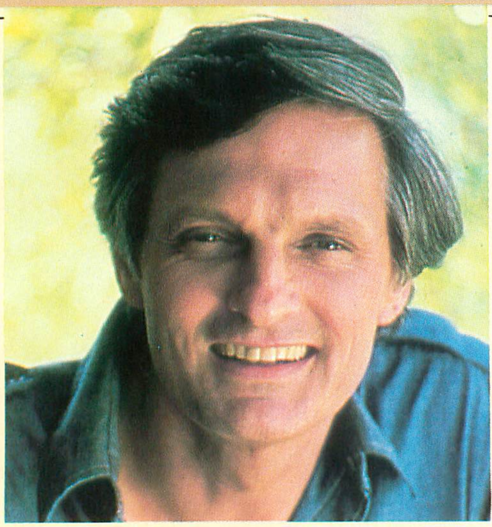
The ATARI® Resource

DECEMBER 1983 VOLUME 2, NUMBER 9

- 101 Products for your Atari Computer
- Atari Snowflakes
- Two Type-in Computer Games
- Atari Greeting Card
- Automated Player/Missiles
- Anatomy of a Robot







Computer enthusiast Alan Alda uses the ATARI 800XL Computer System. Alda reports: "It's going all the time!"

Introducing the Atari® XL Home Computers: We made them smart enough to know you're only human.



The new ATARI XL Home Computers prove that you can blend state-of-the-art technology with good old fashioned friendliness. What's a friendly computer? For one thing, it's a computer that speaks your language. Both the new ATARI 600XL™ and the new ATARI 800XL™ Computers come with a built-in BASIC language that uses the same simple English you use to converse with the rest of the world.

Press the HELP button, not the panic button.

Every ATARI XL Computer comes with a HELP key. Something you won't find on any other home computer. New programs are becoming available that let you use this key for helpful "prompts" when you're unsure of what to do next. Press another special key and your ATARI XL automatically performs a self-diagnostic check—a feature that can save you a needless trip to one of our more than 1,000 ATARI Service℠ Centers.

The ATARI 600XL: It Gets Smarter As You Do.

With 16K of memory, the inexpensive ATARI 600XL can handle over a thousand programs: including education, home management, word processing and personal development. Like all ATARI Home Computers, it gives you 256 colors, four sound channels and Atari's unsurpassed graphics. But unlike a lot of other computers, the ATARI 600XL is ready to grow when you're ready to grow. Every ATARI XL Computer is fully compatible with every ATARI peripheral ("peripherals" are added on to expand what your computer can do).

ATARI peripherals include: a low-cost, letter-perfect printer for word processing. A telephone modem that lets you use your telephone to connect your computer to other computers thousands of miles away. A disk drive and a cassette recorder to store data. And Trak—Balls™ and joysticks to use with Atari's unequalled lineup of great arcade hits. An ATARI 600 XL Computer can be turned into a very brainy 64K computer at a very affordable price.

The ATARI 800XL: Power Enough For Over 2,000 Programs:

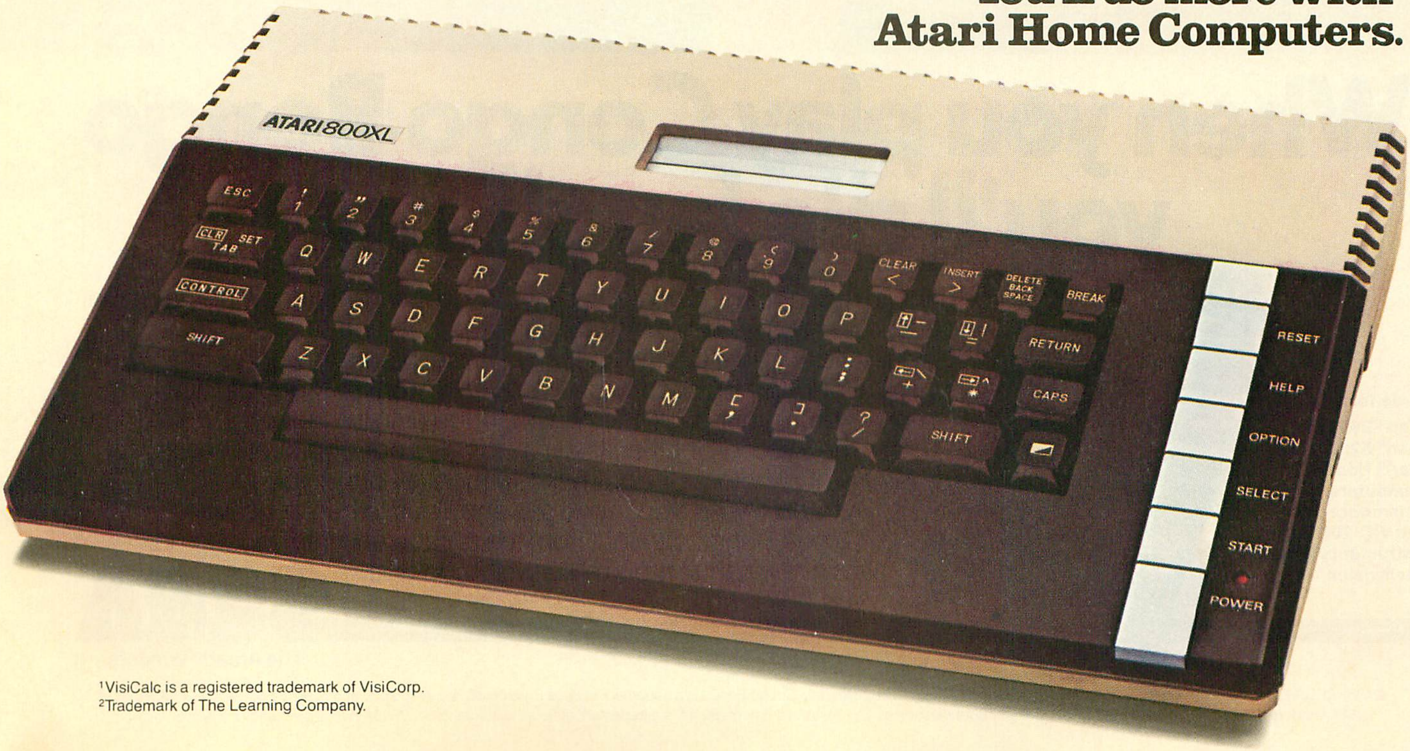
With 64K of built-in memory (as much as the more expensive Apple and IBM computers), the ATARI 800XL can take on any of over 2,000 software programs. That's five times as many as a Commodore 64.

There's VisiCalc®[1] for electronic spreadsheets—faster than the fastest accountant. The Home Filing Manager™ to help keep track of everything from medical records to phonograph records. Family Finances to keep up with your cash flow. Educational programs like "Juggles' Rainbow"[2] that helps preschoolers develop skills necessary for recognizing the alphabet. Even "An Invitation To Programming,™" for learning how to program.

When You've Got Our Computer, You've Got Our Number.

If you ever find yourself stuck, or have any questions at all, just give us a call. 800-538-8543. (In California, 800-672-1404.) Feel free to talk it over. Because if there's anything friendlier than an ATARI Home Computer, it's the humans who make them so friendly.

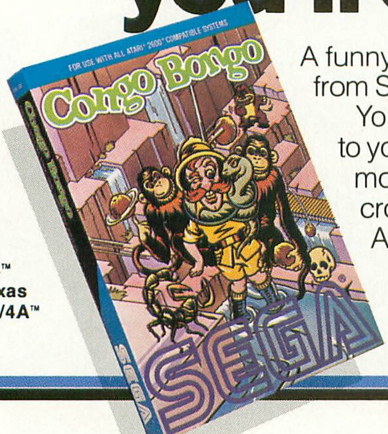
You'll do more with Atari Home Computers.



[1] VisiCalc is a registered trademark of VisiCorp.
[2] Trademark of The Learning Company.



When you play Congo Bongo you'll die laughing.



A funny thing happens when you play Congo Bongo, the new home game from Sega. In fact, a lot of funny things happen.

You have to get to Congo, the mighty ape, before the jungle beasts get to you. Dodge falling coconuts as you scale Monkey Mountain. Shake the monkey from your back and chase Congo onto the lagoon screen. Then cross the water on the backs of hippos, lily pads and hunter-eating fish. And do it all before Congo makes a monkey out of you.

But watch your step — one slip and it's off to hunter heaven.

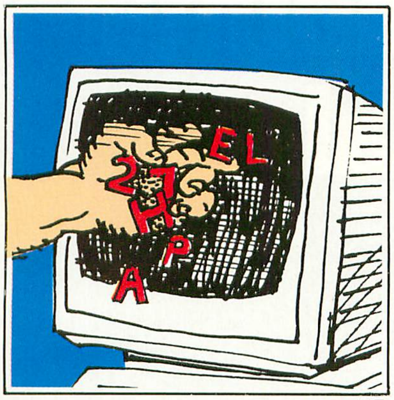
Congo Bongo. Straight from the arcade and into your home. It's more fun than a barrel of, well, monkeys.

Made for:
Atari® 2600™
Atari® 5200™
Atari® Home Computers, Commodore 64™ and VIC-20,™ Texas Instruments 99/4A™ Intellivision®

SEGA®
The Arcade Winners.

Antic™
The ATARI Resource DECEMBER 1983 VOLUME 2, NUMBER 9

★BONUS GAME★



page 77

FEATURES


page 118

DEPARTMENTS


page 134

SPECIAL SECTION

We just made owning an Atari computer a lot more logical.



Introducing the Rana 1000 disk drive. It's a whole new game for Atari computers.



This two digit LED readout displays a code that tells you everything you need to know.

This beeping button tells you your write protect feature is keeping your information safe.

The remaining buttons beep when touched, and provide readouts on density storage, error status, and drive number.

This button beeps when you touch it, and the LED readout tells you what track you're on.

When Rana Systems introduced the Elite Series of Apple® compatible disk drives, we didn't know what a tremendous impact they would make. It turned out to be a line so outstanding in performance, styling, capacity, and price, that it instantaneously made us a major force in the market. Well, needless to say, the response was so great that we were forced to create the same highly advanced disk drive for Atari.® A disk drive that when coupled with Atari's computer, could perform everything from accounting, financial planning, and stock charting, to word processing, business management, and letting you write your own programs. Plus, we made it simple enough for a child to use, for learning anything from the alphabet to a foreign language.

Working with a diskette versus playing with a cassette.

Let's face it. The only reason Atari made a cassette option to their computer was to make it affordable. But now you don't have to settle for less. Because now you can get a diskette for your Atari computer which outperforms their cassette and costs ⅓ less than their disk drive. With Atari's cassette you only get half the functions of a computer compared to what our floppy disk can give you. Their cassette is not only limited in the software available, but it also takes 20 times longer to get the information you need. And Rana's disk drive offers twice the storage capacity of either their cassette or disk drive.

Why even stylewise our new low profile design not only looks 100 times more spectacular, but it occupies 3 times less space. And our new Rana 1000 also gives you a piece of its mind every time you use it, because our disk drive gives you information as well as takes it. And we think that says a lot.

The disk drive that has all the answers.

Rana offers you a myriad of features Atari couldn't even conceive of. Like five electronic functions on the front panel that actually beep and give you a LED readout when touched. Our disk drive tells you what track you're on, and what density and how much information you're storing. It lets you switch from a single density of 90,000 letters to a double density of 180,000 letters, on a single diskette. And, we have a write protect feature which protects your diskette from being erased. In fact, no other disk drive can offer you that.

As you can see, it was easy to build a disk drive superior to Atari's. Because for every reason you buy a disk drive, Rana has superior technology.

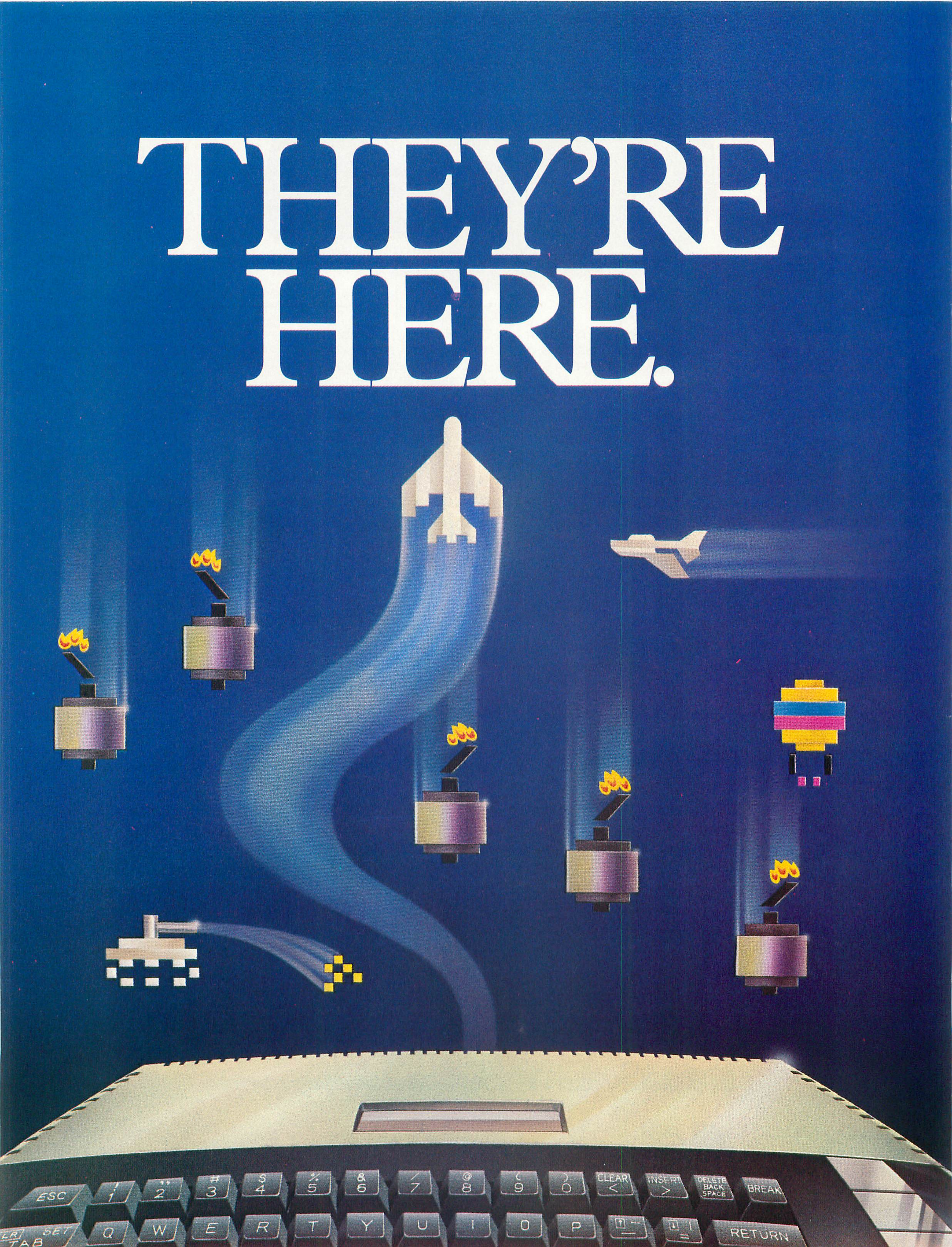
The Rana 1000 disk drive. It brings your Atari computer to a higher level of sophistication for a price one third lower than Atari's. So your choice shouldn't even be a matter of logic.

Just common sense.

RanaSystems *Always a step ahead of the originals.*

Available at all participating Computerland stores and other fine computer dealers.

® Apple is a registered trademark of Apple Computer, Inc. ® Atari is a registered trademark of Atari, Inc., a Warner Communications Company. See us at the West Coast Computer Show. Circle 44


THEY'RE HERE.
ESC
CLEAR
INSERT
DELETE BACK SPACE
BREAK
Q W E R T Y U I O P
RETURN

River Raid™ and Kaboom!® are here. And your Atari® home computer just became more fun than ever.

Because River Raid and Kaboom! have been re-designed to take full advantage of home computer capabilities.

Far beyond anything you've ever experienced before in video games.

Unique graphics, crisp detail and brilliant sound all come together with spectacular impact.

River Raid,™ the battle adventure up the "River of No Return."



The realism of Carol Shaw's River Raid is utterly amazing.

It challenges your reflexes, stamina and strategic savvy as you battle your way up the winding river.

Enemy choppers. Jets. Tanks. Hot-air balloons. Ships. All out to blow you to smithereens.

But you strike back.

Keeping one eye on the ever-changing terrain.

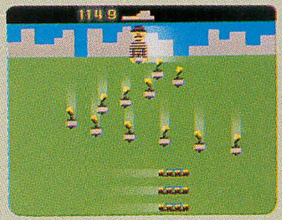
Bridges. Mountains. Canyon walls. Islands.

One false move and it's curtains.

And if you're up to it, now you can skip easier sections of the river and get right to the heart of the battle.

Everything that made River Raid such a smashing hit is here. And tons more.

Kaboom!®, the award-winning game of catch with buckets and bombs.



Larry Kaplan's Mad Bomber is back. The buckets are back.

But now, in Paul Willson's adaptation, you can drop the bombs, while someone else tries to catch them.

Imagine dropping bombs. Faster and faster.

To the ever-quickening pace of the 1812 Overture.

You shift right. Left. Back again. All the way right.

He misses! You win!

Now it's your turn to catch. The pressure mounts.

The bombs start flying. You dash to catch them.

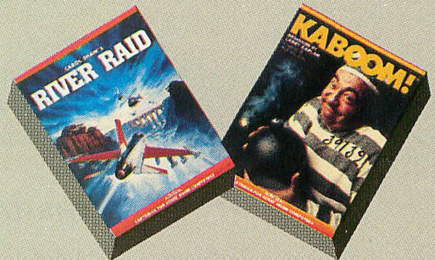
And so it goes on into the night.

And everytime you hit a new high score, it's displayed after the game, just like at the arcade.

Kaboom! and River Raid for your Atari home computer.

They're here.

Just for the fun of it.



ACTIVISION®

Antic™

The **ATARI** Resource

Publisher
James Capparell

Managing Editor
Robert DeWitt

Assistant Editor
Christopher Rauber

Technical Copy Editor
David Duberman

Editorial Assistant
Caitlin Morgan

Editorial Clerk
Arla Ertz

Contributing Editors
Carl Evans
Ken Harms
John & Mary Harrison
David & Sandy Small
Jerry White

Art Director
Marni Tapscott

Production Artist
Kyle Bogertman

Contributing Illustrator
Beatrice Benjamin

Cover Illustration
John Mattos

Circulation Manager
Les Torok

Subscriptions
Kathryn Katz
Julianna Hoffman

Advertising/Production Coordinator
Linda Tapscott

Advertising Sales
Steve Randall

Accounting
V.J. Briggs

ANTIC is an independent periodical not affiliated in any way with Atari, Inc. ATARI is a trademark of Atari, Inc. All references to Atari products are trademarked and should be so noted.

December 1983
Volume 2, Number 9

ANTIC—The ATARI Resource, is published twelve times per year by ANTIC Publishing. Editorial offices are located at 600 18th Street, San Francisco, CA 94107-3076. Telephone is (415) 864-0886. ISSN 0745-2527. Second Class Postage paid at San Francisco, California and additional mailing offices. POSTMASTER: Send address change to **ANTIC**, 600 18th Street, San Francisco, CA 94107.

Editorial submissions should include program listing on disk or cassette, and text file on media and paper if text was prepared with a word processor. Media will be returned if self-addressed stamped mailer is supplied. **ANTIC** assumes no responsibility for unsolicited editorial material.

Editorial and Subscription Office (415) 864-0886
Circulation Office (415) 863-2340
Advertising Sales Office (415) 661-3400
Accounting Office (415) 552-4485

I/O BOARD

A QUESTION OF CHARACTER

I would like to know how to redefine the Atari character set in BASIC. Also, I'd like to know if you can assign characters to keys like Control-1.

David Cameron
Pittsburgh, PA

See John and Mary Harrison's article in this issue ("Odd Man Reforms"). Some keys used for control functions, like Control-2, have a printable ASCII character associated with them, but others do not. There is no way to assign characters to Control-1 (screen display stop-start toggle) or Control-3 (end-of-file indicator). Similarly, the [RETURN] key is represented by ATASCII 155, but this is also a non-printable character.

—ANTIC ED

DISK DRIVES FOR 800

We are in the market for a single/double (density) disk drive for our Atari 800. We would like help in comparing features and finding out which drives will be compatible with the upcoming DOS 3.0. Also, we have heard mention of a new Microsoft BASIC II. Are programs written for the original Microsoft BASIC compatible with the new version?

Len and Ann Clark
Corry, PA

The only drive on which you can use the "dual density" capability of DOS 3.0 is the Atari 1050. And yes, programs written for the original Microsoft BASIC are compatible with the new version. By the way, "Mission Redux: Disk Drive Daze" in this issue reviews a number of disk drives with respect to their usefulness in professional programming applications. Stay tuned for further information on disk drives in upcoming issues.

—ANTIC ED

THE TAX MAN COMETH

Help! Is there anyone out there selling tax preparation programs suited to the needs of individual taxpayers? I'm looking for a program with some flexibility — one that includes only the tax forms you need, and that can be easily expanded. Such a program's usefulness would certainly justify its cost.

On another subject, is it possible for you to furnish an explanation of your TYPO table?

Ernest Spenard
Biddeford, ME

See "TYPO Revisited" (ANTIC, page 116, April 1983). A free copy of this article can be obtained by sending a self-addressed, stamped envelope to ANTIC. Also, watch for a survey of home financial programs in our February issue.

—ANTIC ED

AUTOMATIC LINE NUMBERING

I'm fifteen years old and an Atari 400 owner. I think it's the best home computer on the market for the price. I also like the TRS-80 Model III's "auto line number function," so I created the following short program that does the same thing, and lists the last line entered.

```
1 DIM A$(120)
2 LIST NUM
3 NUM=20
4 ? NUM;" ";
5 POKE 710,0
10 A$="":OPEN #2,4,0,"K:"
11 GET #2,A:IF A=155 THE
N CLOSE #2:GOTO 14
12 ? CHR$(A);
13 A$(LEN(A$)+1)=CHR$(A)
:GOTO 11
14 POKE 709,0
15 ? "⇱":? :? NUM;A$:? :
? "3NUM=";NUM+10:? :? "CO
NT":POSITION 0,0:POKE 842
,13:STOP
16 POKE 842,12:POKE 709,
158
17 ? "⇱":GOTO 2
```

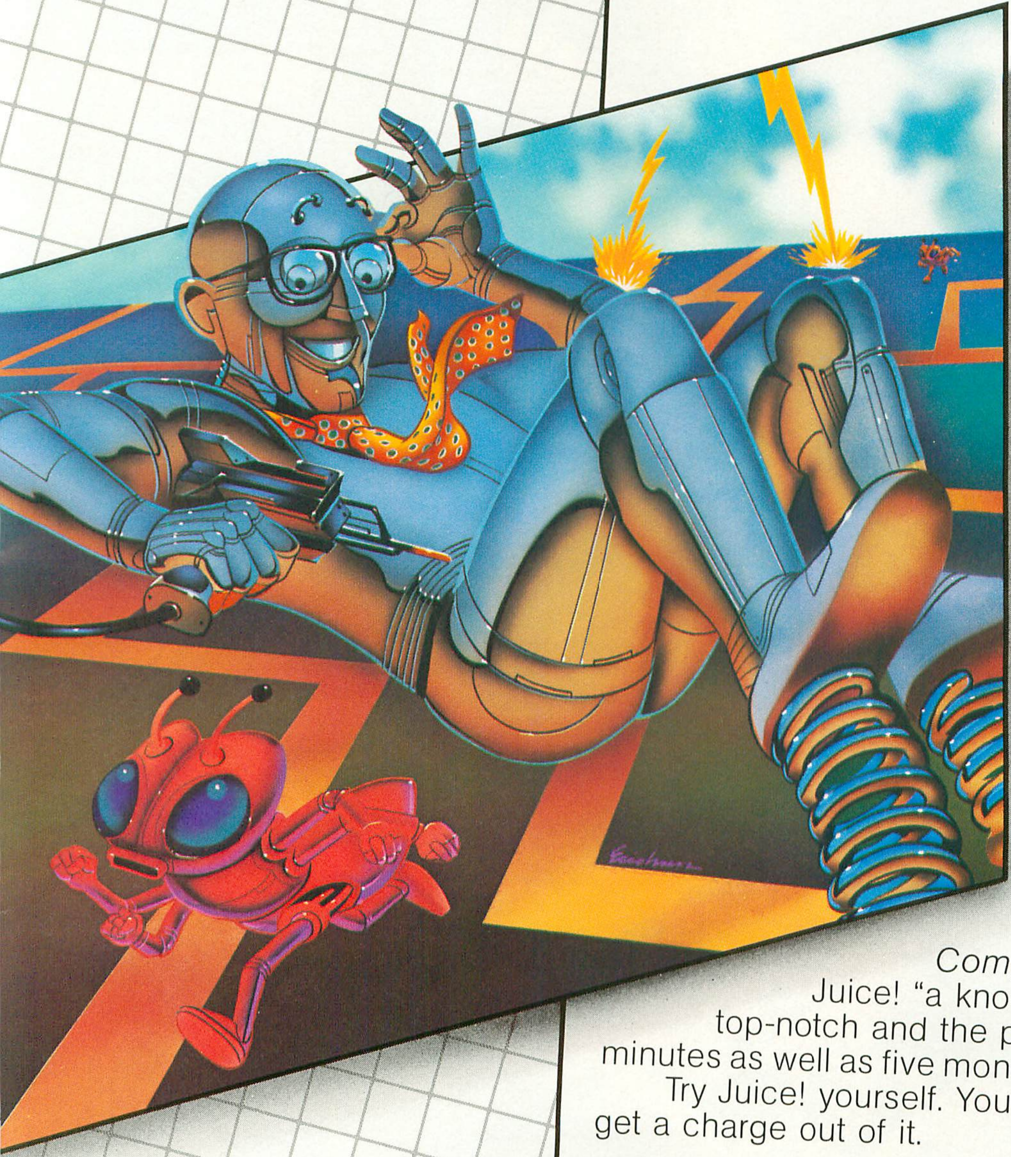
To run the program that this program helps enter in, type the following line and RUN:

0 GOTO 20

Dean K. Beers, Jr.
Passadumkeag, ME

continued on page 14

The ultimate current event.



Edison, the kinetic android, leads a frustrating life.

All he wants to do is build his circuit boards and go with the flow. But things keep getting in the way.

Nohms—a negative influence—bug him constantly. They're harmless, but only from a distance.

Flash, the lightning dolt, disconnects everything in his path. Which can be frustrating after a hard day on the circuit.

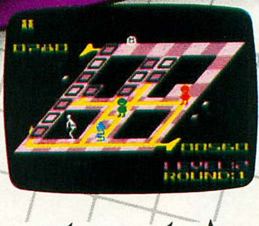
And the cunning Killerwatt is out to fry poor Edison's brains. But our hero simply solders on.

Compute's Gazette calls Juice! "a knockout... the graphics are top-notch and the play action is fun for five minutes as well as five months."

Try Juice! yourself. You'll get a charge out of it.

Developed by Arti Haroutunian
Available for your Commodore 64™
and Atari Home Computer.

JUICE!



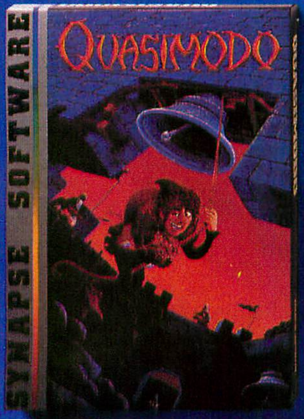
TRONIX™

8295 South La Cienega Blvd.
Inglewood, CA 90301 (213) 215-0529



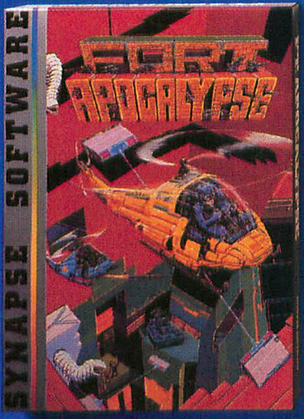
FOR ATARI® HOME COMPUTERS
Pop open a box of
ENCOUNTER!
SYNAPSE SOFTWARE
elite club
Can you survive?
Alone on a distant planet, you stumble into an ancient combat training course that plays for keeps. Can you survive the deadly drones and sneaky saucers? Encounter.™
Atari is a trademark of Atari, Inc.
© 1983 Synapse Software

Synapse excitement!



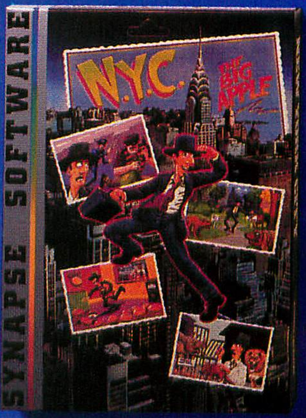
A bellringer's nightmare!

Quasimodo knows who stole the crown jewels. He even knows where they are, but the soldiers just won't leave him alone. Help Quasi dodge the guards and return the jewels to their rightful owner. Quasimodo.™



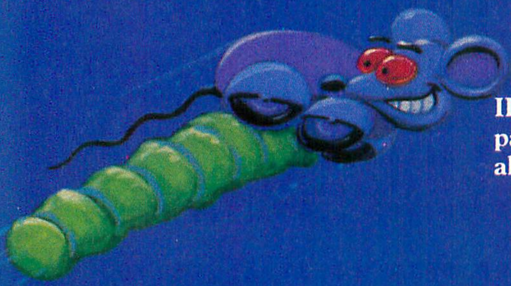
Take the controls

Your helicopter mission—capture vital fuel and weapons, free the enslaved masses, and finally destroy the fortress itself. Will you triumph or be crushed by the fiendish Kraalthan lords? Fort Apocalypse.™



The Big Apple bites back

You're a tourist taking your first bite of the Big Apple. Little did you realize how much trouble you could get into in broad daylight! New York City.™



Join the Elite today!

A whole new dimension in gaming from the leader in home computer excitement! Elite Club membership entitles you to an ID card, certificate, a Synapse hat, patch and quarterly newsletter, all for one low membership fee.





You'll also receive advance information on new Synapse games and be able to buy special T-shirts and posters. Join the Elite today, or send for more information and receive a FREE Synapse patch!



Special Offer: The first 1000 members also receive an incredible Blue Max™ poster!



☐ **YES. Send me a FREE patch and more club information.**

☐ **YES, I want to join. I've enclosed $10 for one membership or $15 for my family. ($12/$17 in Canada). Cash, check, money order or VISA/MasterCard.**

Name____________________

Computer____________________

Address____________________

City____________________

State__________ Zip__________

Please allow six to eight weeks for membership processing.

synapse SOFTWARE

5221 Central Avenue, Richmond, CA 94804 · (415) 527-7751

ATARI & VISICALC?

I'm trying to set up a simple accounting system using my 800 (with 48K), an Epson printer and VisiCalc, but I keep running out of memory! Would expanding to 64K be a good idea? Also, can I get an 80-column display on my color TV screen with the Bit3 package?

T.R. Rolfes
Wyoming, OH

Atari and VisiCalc are excellent partners for serious applications. Atari advises, however, that a 64K bank-select memory expansion board will add only 4K of usable memory for VisiCalc. The Bit3 board is good, but will only work (80-column mode) with a monochrome monitor. We use this package ourselves, and it has served us well. See "ANTIC Pix Gifts," (ANTIC, Nov. 83) for monitor suggestions, and watch for an integrated calc package from Synapse Software. —ANTIC ED

KUDOS

Having been a magazine buff for some time, I was very pleased to run across your publication in the computer store. I subscribe to such diverse magazines as *Forbes, Business Week, Discover, Popular Science, Bicycling* and *Personal Computing*, but I've never read a magazine before that has consistently carried so many interesting articles on its particular area of coverage. I commend you for a job well done.

Christopher Wilson
Kernersville, NC

MOSAIC FIXES

I'm puzzled by the fact that no one has written in about software that has problems running with the Mosaic 64K RAM card. When used with the card, **Wayout** by Sirius, for example, displays one-and-a-half mazes. The fix for this is to boot up with the BASIC cartridge installed. Similarly, valFORTH Video Editor 1.1 doesn't work when you issue the V command (when used with the Mosaic card); this causes the screen to go crazy. The solution is to warm start. As far as I can tell, everything works fine after that, with the possible exception of SMOVE. I'd be interested in hearing from other readers who have experienced software problems with the Mosaic board.

Robert Kanach
Norristown, PA

ATARI PIANO

There is a simple program that turns the top two rows of the Atari keyboard into a piano keyboard (C scale) with the TAB = low C. The space bar clears the sound.

```
10 REM ATARI PIANO: AUGUST, 1983 BY ROBERT ENDE
20 RESTORE
30 READ KEY,PITCH
40 IF KEY=-1 THEN 20
50 IF KEY<>PEEK(764) THEN 30
60 SOUND 0,PITCH,10,6:GOTO 20
70 DATA 44,243,31,230,47,217,30,204,46,193,42,182,24,173,40,162,29,153
80 DATA 45,144,27,136,43,128,11,121,53,114,13,108,48,102,8,96,10,91,54,85
90 DATA 14,81,55,76,15,72,52,68,12,64,33,0,-1,0
```

Robert Ende
Commack, NY

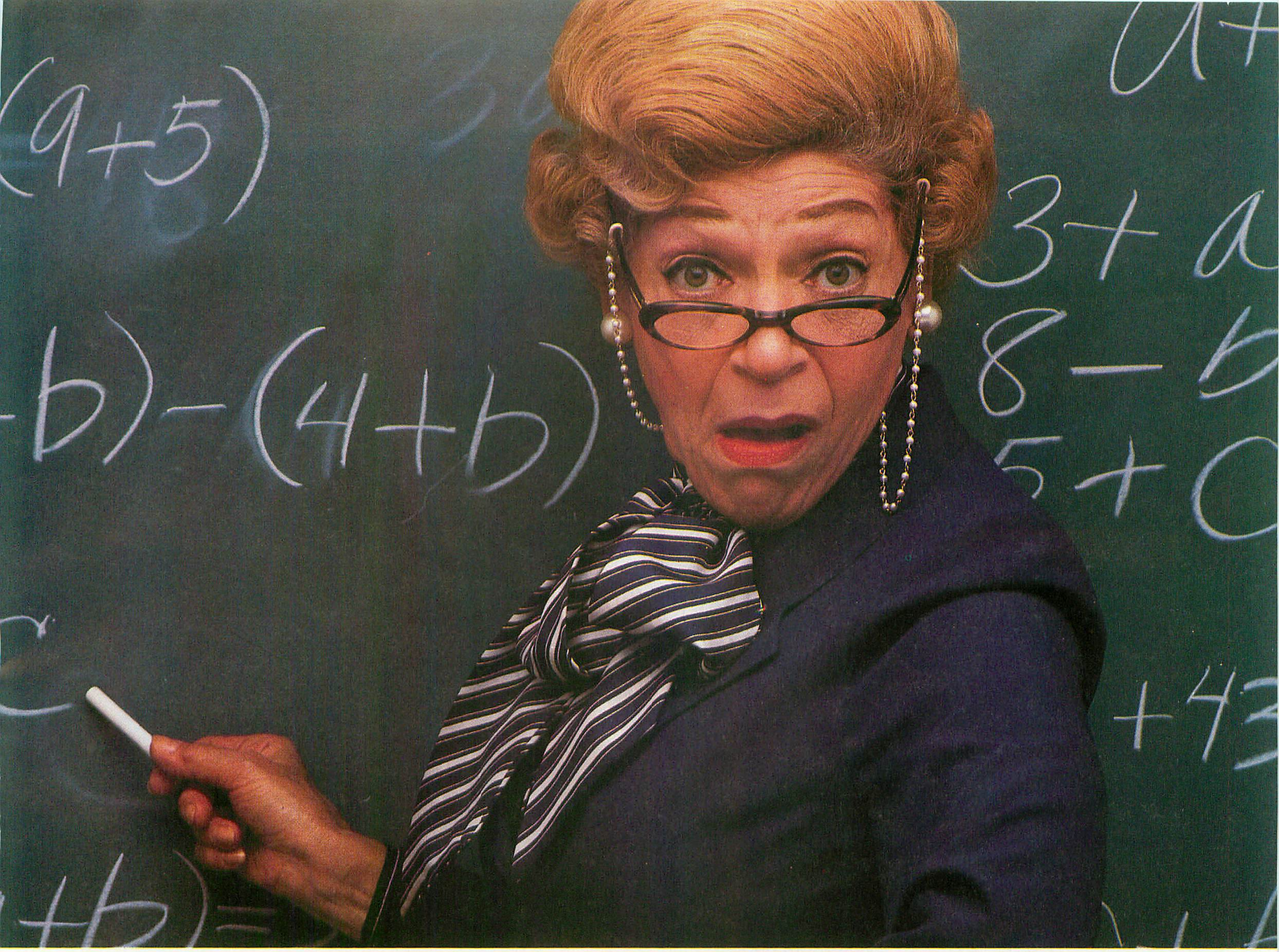
HOW ABOUT COBOL?

Can an ATARI 400 be programmed to understand COBOL?

Steve and Brinda Smith
Channelview, TX

Not really. COBOL is designed for use on mainframe computers. It is best suited for file manipulation and data base uses, and is often used in the data

continued on page 18



Turn On Your Algebra Teacher.

No, not **your** algebra teacher. Our algebra teacher.

Now, with Beginning Algebra, from Program Design, Inc., you can improve and acquire new math skills and never leave home.

Beginning Algebra is more than just a game or a review course. Beginning Algebra is the most comprehensive package you can buy. You'll learn all the important laws of algebra including mathematical statements, exponents, signed numbers, terms variables and much more.

The program's structured but informal approach lets you learn at your own pace. With it you'll go from exploring the basic fundamentals of algebra all the way up to its advanced stages.

And to help you remember what you've learned, PDI has designed Beginning Algebra in short, easy to absorb lessons. Each lesson is followed by a quick quiz, to help reinforce everything you've learned. We even provide worksheets for further practice.

With its use of sound and color, anyone will find learning with Beginning Algebra a real turn on. Even your algebra teacher. So, pick up PDI's Beginning Algebra for your Atari, Commodore 64 or Apple computer at a store near you.

PDI

Program Design, Inc. 95 East Putnam Avenue, Greenwich, CT 06830


MEET YOUR CHALLENGE
MINER 2049er
BOUNTY BOB
XXX
In Miner 2049er,™ you helped the legendary mounty, Bounty Bob,™ track the villainous Yukon Yohan™ through an abandoned uranium mine — all ten levels of it — grabbing buried treasure and avoiding deadly radioactive mutants along the way.
Well, that was only the beginning!
Yukon Yohan has escaped to the city and Bounty Bob is after him! Only this time, Bob's run out of bucks, so he's taken a job as a fireman to fund the chase. And guess which villain has torched a skyscraper to trap Bounty Bob?
You guessed it — Yukon Yohan!
Scraper Caper™ has all the action, adventure and excitement that can be packed into a ROM cartridge. And it features a mind boggling number of rounds, difficulty adjustment, high score table, demo mode and spectacular sound and graphic effects.
Miner 2049er is a gamer's gold mine, but you've got to beat Scraper Caper to get to the top! Scraper Caper is available from your local dealer for the ATARI® 5200 Supersystem™ and all ATARI Home Computers.
Suggested Retail $49.95
BIG FIVE
SOFTWARE
14640 Keswick Ave., Van Nuys, CA 91405 (213) 782-6861
"Miner 2049er", "Scraper Caper", "Bounty Bob" and "Yukon Yohan" are trademarks of Big Five Software. "ATARI" and "ATARI 5200 Supersystem" are registered trademarks of Atari, Inc.


HOTTEST
YET IN...
SCRAPER CAPER
Programmed by Bill Hogue
2049

I/O BOARD

processing centers of banks and insurance companies. COBOL is not suited for home and personal computing, and although the ATARI can be made to understand the language, it is not worth the effort. —ANTIC ED

WISH LIST

I'm looking for an all-purpose joystick move routine for Player/Missile graphics. Ideally, this routine would let you use different numbers and resolutions of players or missiles, and would provide a way to change their sizes. Also, response to the joystick movement should be fast and smooth. Finally, you should be able to use your own data for the player images.

David Williams
Danville, IL

See "Player/Missile Tutorial" (ANTIC, page 14, September 1983). We feel that this article was an excellent introduction to the subject. Further articles on Player/Missile graphics are on the drawing board. —ANTIC ED

EDUCATIONAL VALUE

I want to congratulate you on "Computers in Education" (ANTIC, September 1983) by John and Mary Harrison. I can't think of any change or addition to your magazine that would increase its value as much as a renewed commitment to education. My original reason for purchasing the Atari 400 was to introduce my children to the world of the microcomputer, and I feel there is still a tremendous need for information about the educational aspects of the Atari. Anything you can do to fill this void would be invaluable.

Steve Ottinger
Martinsburg, WV

Thanks for the kind words. Any suggestions for our Education Department are most welcome. —ANTIC ED

PRETTY PICTURES

I liked the pictures in the ANTIC Cover Art Contest (August, 1983). Are these (and other) pictures going to be available to ANTIC readers?

Jim Di Napoli
Vernon Hills, IL

Not on media at this time. Most require commercial programs to load in your computer. —ANTIC ED

HELP!

AUTOBOOT FOR CASSETTES

In ANTIC, Oct. 83, page 78, the additional information will clarify proper procedure. Just prior to "Step 6" add this:

You should now remove the program tape and insert the tape on which AUTOCAS has written its short program (the header). Then CSAVE your BASIC program to this tape. If you have done it right, it should be immediately behind the header.

MAKE A FACE

In the article "Make A Face" (ANTIC, October 1983) there is an error in Figure 1 on page 54. The numbering on the second row of pins on the leftmost DB9 jack is reversed: the order should be 6, 7, 8, 9. The signal ground should be connected to pin 8, which is the third pin from the left in the second row. If pin 7 is used, damage to your printer and/or computer may result. We deeply regret any difficulty this may have caused.

SPACE CASE

In "Binary Autoload" (ANTIC, p. 86, September 1983), the spacing in line 3030 of the listing is misleading. For the program to work correctly, there should be twelve spaces after D: and before the final quote sign in line 3030.

+45 = −45?

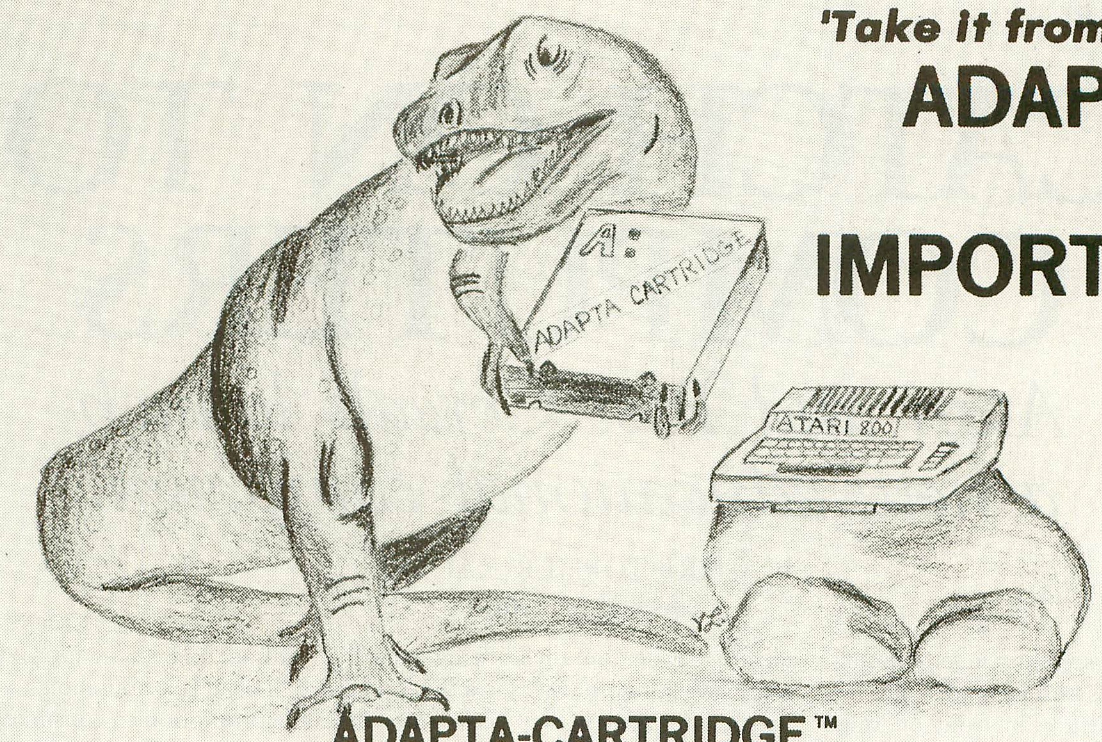
"3-D Fuji" (ANTIC, August 1983) is the most interesting article I have ever read. However, it tends to be a bit confusing. The example in Fig. 1 shows the Z axis at −45° (rather than at +45° as stated in the article). In addition, the X projection (TX) would actually use the cosine, and the Y projection (TY) the sine; this keeps the signs straight.

Joseph A. Gillis, Jr.
Annapolis, MD

You're right. Plotting 3-D graphics on a two-dimensional screen can be confusing! Unfortunately, many computers — including the Atari — make the confusion worse by setting up screen coordinates in a different way than standard mathematical graphs. The Atari makes Y values larger as you move from the top of the screen toward the bottom; standard graphs make Y larger going from the bottom to the top. Atari also uses due "south" on the screen as 0° for plotting trig functions; conventional usage has 0° at due "east." Thus, −45° in a conventional system is equivalent to +45° on the Atari. Since the equations in the article were part of a program written in Atari BASIC, we used Atari's conventions. —ANTIC ED

'Take it from me . . .'

ADAPTING IS IMPORTANT!



ADAPTA-CARTRIDGE™

ADAPTA-CARTRIDGE A:™ for the left slot in ATARI® 400, 800, 1200XL™

ADAPTA-CARTRIDGE B:™ for the right slot in ATARI® 800

Definitely not your standard ROM cartridge! ADAPTA-CARTRIDGE is programmable like RAM, yet retains information when turned off like ROM.

A built-in device handler allows files of information to be stored similar to disk.

In addition to its ability to run standard ROM cartridge format programs, new types of self-modifying programs are possible.

INTRODUCING! **NEW!**

ADAPTA-COMMAND™ is a separate program which exemplifies the new adaptive power available. Command statements can be stored inside the ADAPTA-CARTRIDGE for recall at any future time with single keystrokes. Also, commands can automatically be executed at computer turn-on. Uses include storing macro-commands for text editing, custom interface preparation for peripheral devices, and turn-key system programming.

The **ADAPTA-CARTRIDGE** has its own built-in utilities. By menu selection, files of information can be made or loaded, memory can be inspected and modified, and the **ADAPTA-CARTRIDGE** can be tested and cleared. The main menu is available under program control, during various stages of computer turn-on, or is defaulted to if no programs within the cartridges or loaded files wish to run. The menu gives complete control to you and facilitates generation of custom cartridge programs. For example, many standard disk file programs can now be stored in the **ADAPTA-CARTRIDGE** and automatically executed as if they were ROM cartridge programs.

ADAPTA-CARTRIDGE A: and ADAPTA-CARTRIDGE B: can operate independently or together for larger programs.

All three modes of operation i.e. MENU mode, HANDLER mode, and CARTRIDGE mode, have special options available unlike anything you have seen before.

For additional information call or send for our free brochure

For Adaptive power call or send for the **ADAPTA-CARTRIDGE!™**
(Sugg. List $189)

☐ **YES.** I want to be on top of things. Send me a brochure.

☐ **YES.** Send me your Christmas package of both A:™ and B:™ for only $289.00.
(Minnesota residents please add 6% sales tax)

Name ____________________
Address ____________________
City, State, Zip ____________________
Telephone (   ) ____________________ ☐ Check Enclosed
VISA/Mastercard ____________________ Exp. Date ________
Signature ____________________

Microsota, Inc.

P.O. Box 728 • Hibbing, Minn. 55746
Tel: (218) 262-6691

CATCH ON TO COMPUTERS

Atari and Post Cereals launch a new educational campaign.

by CHRISTOPHER RAUBER,
Assistant Editor

At first sight, the scene is pandemonium. Forty boisterous third-graders fill the room. Seated fitfully in front of long rows of brightly lit monitors, they appear to be vibrant patches of energy rather than San Francisco school children. Pigtails bounce, shouts echo across the room, and keys are pressed and plinked over and over, seemingly at random. It seems that high technology has met its match. It's hard to believe that any learning is going on here.

But, on closer inspection, something positive, and educational, *is* happening. Graphics "turtles" are hurtling about on each of forty screens. Spirals, starbursts and other, more random, patterns appear on the monitors. And by ones and twos, a roomful of eight-year-olds begins concentrating mightily on providing just the right set of instructions to those troublesome turtles.

The children are using Atari Logo in a tutorial led by professional instructors.

The place is The Exploratorium, a science museum in San Francisco. The event is the opening of a 10-day "Catch on to Computers" learning festival. Sponsored by General Foods' Post Cereals and Atari, Inc., the event is part of a campaign to promote computer literacy among children and adults across the United States. The program is hosted by Computer-Using Educators (CUE), a non-profit corporation dedicated to promoting and improving computer use in schools and colleges.

Simultaneously, a similar scene of gleeful pandemonium is being played out in Washington, D.C. And that's just the beginning. For two weeks this fall these hands-on festivals will take place in eight more cities around the country: Los Angeles, Denver, Houston, Chicago, New Orleans, Atlanta, Newark, and St. Louis. The effort is expected to expose more than 50,000 adults and children to the advantages of Atari computers, including the new XL models.

According to the events' sponsors, elementary and secondary students and teachers, along with parents and other adults, will take part. Some membership groups will also be invited to attend. The ages of the participants will range from six to 60, according to one spokesperson, who predicts that "senior citizens who don't want to be left behind by the computer revolution" may also sign up and participate.

A number of handicapped children will also be exposed to the free one-hour tutorials. These will include both deaf and mentally retarded youngsters.

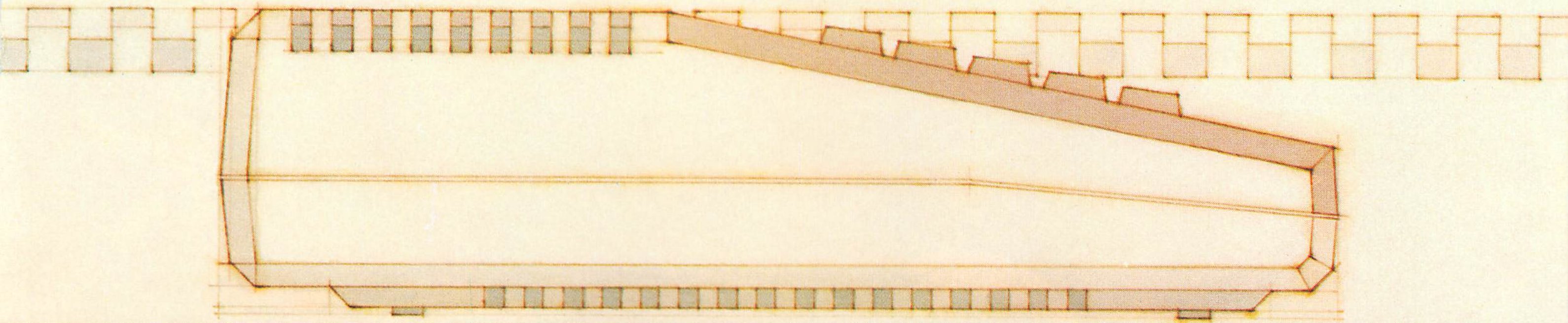
The second phase of the "Catch on to Computers" campaign is a multi-million dollar promotion that will offer free Atari hardware and software to schools and membership organizations in exchange for "Fun 'n Fitness" proof-of-purchase seals from the entire line of Post Cereal brands. The national program kicked off with a September 30 mailing of catalogues detailing the offer to more than 91,000 schools.

A simultaneous direct mailing to 41 million homes — approximately one half of all U.S. households — announced the promotion to consumers and identified the participating Post brands and Atari products.

To obtain the free equipment, schools must collect a specific number of Post proof-of-purchase points for each item, which range from the Atari 800 XL and 1450 XLD home computers to printers, cassette and disk drive units, expansion devices and a wide selection of high-quality educational programs.

"Given the financial condition of many schools, we've been able to develop a constructive, responsible promotional vehicle that addresses a real need in the educational sector," notes Tom Herskovits, general manager of General Foods' Breakfast Foods Division. "By teaming up with Atari, we can now offer new and extended Atari hardware and software, including more than 2,000 application programs — something schools will find invaluable."

That's for the grownups. The kids have other ideas. "It's fun!" says one young third grader as he focuses in on the screen. "It's just like the one I use in my computer class," exults Scott, a small boy with horn-rim glasses, "but this is the first time I've used three turtles!" But, as usual, a teacher has the final word. According to Joann Raddue, a third-grade teacher at Brookside School in San Anselmo, Calif., "The kids are extremely excited about computers."

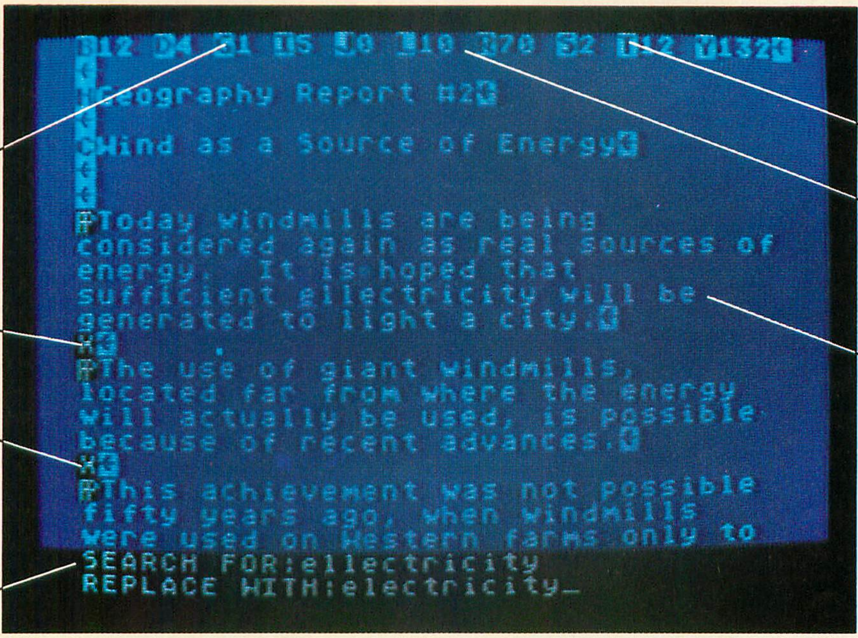


Prints with built-in format or lets you create your own: center, underline. Boldface, elongated, proportional and condensed print.

Inserts and deletes characters, lines or blocks of text.

Duplicates and moves blocks of text.

Searches for and/or replaces words or phrases, one at a time or all at once.



Changes line spacing, margins, print type, paragraph indents anywhere in the document.

Instantly reformats.

Enters text easily, with word wrap, one main menu and helpful prompts.

Creates multi-line headers and footers.

Prints double columns, form letters, multiple copies of a page or document, at the touch of a key.

Numbers pages and creates section numbers automatically.

Corrects spelling (with extra software).

Chains and merges files.

Has "print preview": you can check your copy before it's printed.

You can't find a friendlier, more powerful word processor at twice the price. New AtariWriter.™ Under $100.

Now you can do multi-featured word processing at home, simply. At a family budget price.

Our ROM-based cartridge technology means you can use new AtariWriter on any ATARI® Home Computer (even 16K) for personal and business correspondence, term papers, committee reports, mailings, etc.

It also lets you choose between cassette and disk storage systems.

One very special AtariWriter feature: you can correct as you write, without switching back and forth between Create and Edit modes.

And our memory buffer offers an "undo" command to let you change your mind, and restore text you've just deleted.

Check into our remarkable AtariWriter, and our choice of letter quality and dot matrix printers, also reasonably priced, at Atari dealers. Call 800-538-8543 for dealer nearest you. In California, call 800-672-1404.

You'll do more with Atari Home Computers.





'Twas the night before Christmas, and all through the house, not a creature was stirring, not even a mouse . . . except for me and my Atari, that is. According to a REM statement in the first version of this program, it was 3:20 in the morning on December 25 when "Snowflakes" first ran successfully. Luckily, with this ready-to-type-in listing, *you* won't have to stay up until the wee small hours!

The program calls on your Atari's artistic skills to draw lacy, detailed snowflakes in GRAPHICS 8 + 16. And, by using the RND (random) function, the Atari snowflakes imitate Mother Nature's — no two will be alike. Let's look at how it works.

Drawing the main arms of the snowflakes is easy enough: just draw six equally-long lines outward from the center of the screen, at angles of 0, 60, 120, 180, 240, and 300 degrees. (Snowflakes have six equally-spaced arms 60 degrees apart.)

How do you make the arms equally long when they're not just vertical or horizontal lines — when they're at an angle? There are several ways, but I decided to think of each arm as being a radius of a circle. This allows you to locate any point along the arm with two equations:

X = RDS*SIN(angle) + 160
Y + RDS*COS(angle) + 96

where X,Y is the location of the point, RDS is the radius of the circle (distance from the center), and 160 and 96 are the horizontal and vertical center of the screen in GR. 8 + 16. Note that since we're expressing angles in degrees, the program has to include the DEG command — see line 1120. Without it, the Atari computes angles in radians. (One radian equals about 57 degrees.)

How long should the arms be? I chose 84 as the length because it looks attractive — the snowflakes fill the screen nicely without crowding the edges. 84 is also evenly divisible by 6, which makes some calculations convenient later on.

Once the six arms are drawn, the program goes back to the center of the snowflake and begins drawing the little spikes that extend from the arms. The spikes are random lengths and are placed either three or six units apart. They can point outward from the center, point inward, or alternate their directions. (In my original early-morning program, these factors were all randomly selected. However, this required using the RND function many times while drawing each snowflake, and the drawing went very slowly. Simplifying things in the way I've described speeds up the program without really reducing the variety of snowflakes you'll see.)

The variable TYPE defines 12 different kinds of snowflakes, with an almost-infinite variety of patterns possible within each type. In addition to varying the distance between spikes and which way they point, TYPE specifies whether the spikes will be just random lengths or whether they will be random but will taper to shorter and shorter sizes as you move out toward the end of each arm. I don't know exactly what shapes it is possible to find in real snowflakes, but using these variables creates patterns that look pretty lifelike to my eye. (And I'm a lifelong resident of Rochester, New York, where everyone is an expert on snow!)

SETTING THINGS UP

The program begins by jumping past the drawing routine (lines 100–270) and going to the setup or initialization section. This is done to keep the frequently-used FOR/NEXT loops in the drawing section as close to the beginning of the program as possible. When the program is running, the Atari has to look for each FOR/NEXT loop beginning at program line 0. The closer the loop is to the beginning, the faster the program will run. Since a single snowflake has as many as 336 spikes, shaving time from the drawing routine makes a noticeable difference.

Line 1000 sets up GR.1 for the title screen. It also sets

Jerry O'Neill is a writer and photographic consultant who has been researching and writing about computer graphics for about ten years. He bought his Atari system "so I could start working with a computer myself, instead of watching over someone else's shoulder."

flakes

by JERRY O'NEILL

CONSOLE = 53279, which is the memory location for reading whether the console keys ([START], [SELECT], [OPTION]) have been pressed. Also, if you POKE a number into this memory location, the Atari's built-in speaker (not the television speaker) buzzes.

Lines 1010 through 1110 generate the opening display. 1100 simply loops back on itself until [START] is pressed. 1120 DIMensions two matrixes and one array: TRIG, which stores sine and cosine values; TILT, which stores the angles for the spikes; and SPIKE, which holds the random lengths of the spikes. 1130–1150 place the necessary numbers into TRIG and TILT. (Arrays and matrixes are simply series of variables — like A, B, C — but since they're indexed by number — like SPIKE(10) — they're valuable in FOR/NEXT loops, because you can use each number in turn.)

Lines 1200–1290 set the snowflake TYPE and compute the numbers that make each snowflake different: ST, the step size between spikes (either 3 or 6); TAPER, to set whether the random lengths will taper or not; and SLANTFLAG, to determine the direction of the spikes. Lines 1250–1270 fill the SPIKE array with random numbers of the needed size. POKE location 77 with 0, in line 1280, to prevent the Atari from going into its color-shifting attract mode. (Pressing any regular key on the keyboard prevents this, but using the console keys such as [START] does not turn off the attract mode.) Finally, line 1290 sends us back to the drawing routine at line 100.

DRAWING A SNOWFLAKE

Line 100 sets high-resolution graphics (GR.8 + 16 = GR.24, the full-screen version without a text window at the bottom). The background color will be blue if it isn't changed, and the program uses blue when TYPE = 1, by skipping line 110. If TYPE = 2 to 12, line 110 sets a random color and brightness for the background and the lines in the snowflakes.

Line 120 draws the main arms. The TRIG matrix serves as a look-up table for the sine and cosine values needed. The reason for using a matrix instead of just including SIN and COS commands is that the trigonometric functions are relatively slow, and using them hundreds of times for each snowflake slows down the drawing process. Especially since we're using only 12 trig values anyway (sine and cosine for 0, 60, 120, 180, 240, and 300 degrees), it's faster to place the values in a matrix and just look them up instead of recomputing them.

Lines 130–230 are the main drawing loop. RDS is the radius, or distance from the center; the program starts at the center and works its way out to the ends of the arms. First, it checks how long the spike will be (SPIKELN) by looking in the SPIKE array. Then it determines the direction of the spike from SLANTFLAG, and switches SLANT from 0 to 1 for the designs that alternate directions. In line 170, D1 and D2 are the codes for the two spikes' directions — one on each side of the arm — taken from the TILT matrix. 180–200 compute X and Y for the spot on each arm from which the spikes branch out, and X1,Y1 and X2,Y2 are the ends of the two spikes.

After all that, line 210 is the very simple command that actually draws the spikes. 220 and 230 complete the loops, and 240 buzzes the speaker to say that the snowflake is done. After you press [START], the program goes back to line 1200 to change to the next TYPE . . . and then it's back to line 100 to draw the next snowflake.

There are certainly other ways this program could be written, and some of them are simpler. I took this approach to make the drawing go as fast as possible. I avoided repeated SIN, COS, and RND commands in the main drawing routine by calculating the values in advance and storing them in arrays and matrixes, so the program could just look them up. For a program written entirely in BASIC, the drawing speed is very satisfactory.

Perhaps the best part of this is that you can type in the program and run it even if some parts aren't completely clear. And if you have questions or suggestions about "Snowflake," please send them to ANTIC. We'd like to hear from you!

continued on page 25

Last Year Over 20,000 Americans Were Committed To Asylum.



Once people enter *Asylum,* they don't *want* to leave. And neither will you.

Inside this thrilling adventure game from Screenplay™ challenges lie around every corner, behind every door. There are hundreds of doors, too!

You've gone crazy from playing too many adventure games. You've been placed in the asylum to act out your delusions. To cure yourself, you must make good your escape.

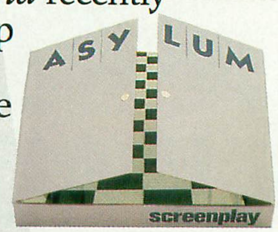
There's no one you can turn to for help. Almost every turn leads to a dead end. Or worse, vigilant guards stand in your way. If you can't outmuscle them, can you outthink them? Inmates line hallways offering help. But can they be trusted?

While getting out of the asylum may take months, you'll get into our game instantly.

Smooth scrolling three dimensional graphics give you a very eerie sense of reality. This feeling is also heightened by the use of full sentence commands.

No wonder thousands of people bought *Asylum* last year, and *PC World* recently named *Asylum* one of the top ten games for the IBM PC.

Play *Asylum.* All you have to be committed to is fun.



Asylum runs in 48K on the Atari, Commodore 64 and IBM PC computers. See your local software dealer. $29.95.

screenplay

Box 3558, Chapel Hill NC 27514 800-334-5470

You could win $10,000 from Screenplay anywhere our games are sold.

SNOWFLAKES *continued from page 23*

```
0 REM SAVE"D:SNOWFLAK.BAS"
1 REM ANTIC MAGAZINE
2 REM JERRY O'NEILL -- 26 SEPT 1983
4 REM RANDOM COLOR BACKGROUNDS
9 REM JUMP TO SETUP ROUTINE
10 GOTO 1000
99 REM PLACE DRAWING ROUTINE NEAR STAR
T OF PROGRAM FOR SPEED
100 GRAPHICS 24:COLOR 1:IF TYPE=1 THEN
 120
110 C=INT(RND(0)*15)+1:B=INT(RND(0)*7)
:SETCOLOR 2,C,B:SETCOLOR 1,C,B+8
119 REM DRAW MAIN ARMS
120 FOR ARM=1 TO 6:PLOT 160,96:DRAWTO
90*TRIG(ARM,1)+160,90*TRIG(ARM,2)+96:N
EXT ARM
129 REM DRAW SPIKES ON ARMS
130 FOR RDS=ST TO 84 STEP ST
140 SPIKELN=SPIKE(RDS/ST)
150 IF SLANTFLAG=3 THEN SLANT=1-SLANT
160 FOR ARM=1 TO 6
170 D1=TILT(ARM,0+SLANT):D2=TILT(ARM,2
+SLANT)
180 X=RDS*TRIG(ARM,1)+160:Y=RDS*TRIG(A
RM,2)+96
190 X1=SPIKELN*TRIG(D1,1)+X:Y1=SPIKELN
*TRIG(D1,2)+Y
200 X2=SPIKELN*TRIG(D2,1)+X:Y2=SPIKELN
*TRIG(D2,2)+Y
210 PLOT X1,Y1:DRAWTO X,Y:DRAWTO X2,Y2
220 NEXT ARM
230 NEXT RDS
240 FOR I=1 TO 50:POKE CONSOLE,0:NEXT
I:POKE CONSOLE,7
250 IF PEEK(CONSOLE)<>6 THEN 250
260 FOR I=1 TO 50:POKE CONSOLE,0:NEXT
I:POKE CONSOLE,7
269 REM CHANGE SNOWFLAKE TYPE
270 GOTO 1200
999 REM SETUP SECTION
1000 GRAPHICS 1:POKE 752,1:SETCOLOR 0,
9,6:CONSOLE=53279
1010 POSITION 5,5:? #6;"SNOWFLAKES"
1020 POSITION 9,7:? #6;"by":POSITION 3
,9:? #6;"jerry  o'neill"
1030 COLOR 42
1040 FOR X=0 TO 19:SOUND 0,121-(X*5),1
0,6:SOUND 1,120-(X*5),10,6:SOUND 2,60,
10,6:PLOT X,0:NEXT X
1050 FOR Y=0 TO 19:SOUND 0,121-(X*5),1
0,6:SOUND 1,60+Y*3,10,6:SOUND 2,59+Y*3
,10,6:PLOT 19,Y:NEXT Y
1060 FOR X=19 TO 0 STEP -1:SOUND 0,121
-(X*5),10,6:SOUND 1,120-(X*5),10,6:SOU
ND 2,60,10,6:PLOT X,19:NEXT X
1070 FOR Y=19 TO 0 STEP -1:SOUND 0,121
-(X*5),10,6:SOUND 1,60+Y*3,10,6:SOUND
2,59+Y*3,10,6:PLOT 0,Y:NEXT Y
1080 SOUND 0,0,0,0:SOUND 1,0,0,0:SOUND
 2,0,0,0
1090 ? "EACH SNOWFLAKE IS DIFFERENT.":
? :? "PRESS START "
1100 IF PEEK(CONSOLE)<>6 THEN 1100
1110 ? "⇱";:? "AFTER EACH IS DONE,THE
BUZZER SOUNDS":? "PRESS START FOR AN
OTHER SNOWFLAKE"
1120 DIM TRIG(6,2),TILT(6,3),SPIKE(28)
:DEG
1130 FOR I=1 TO 6:TRIG(I,1)=SIN(I*60):
TRIG(I,2)=COS(I*60):NEXT I
1140 FOR J=0 TO 3:FOR I=1 TO 6:READ T:
TILT(I,J)=T:NEXT I:NEXT J
1150 DATA 2,3,4,5,6,1,3,4,5,6,1,2,6,1,
2,3,4,5,5,6,1,2,3,4
1160 FOR DEL=1 TO 500:NEXT DEL:? "PRES
S START NOW"
1170 FOR I=1 TO 50:POKE CONSOLE,0:NEXT
 I:POKE CONSOLE,7
1180 IF PEEK(CONSOLE)<>6 THEN 1180
1190 TYPE=0
1199 REM 12 DIFFERENT SNOWFLAKE TYPES-
-USE A DIFFERENT ONE EACH TIME
1200 TYPE=TYPE+1:IF TYPE=13 THEN TYPE=
1
1209 REM ST=STEP LENGTH;TAPER=1 IS TAP
ERED,=2 IS NOT;SLANTFLAG=1 IS UPSWEPT,
=2 IS DOWNSWEPT,=3 ALTERNATES
1210 ST=6:IF TYPE/2=INT(TYPE/2) THEN S
T=3
1220 TAPER=1:IF TYPE=3 OR TYPE=4 OR TY
PE=7 OR TYPE=8 OR TYPE=11 OR TYPE=12 T
HEN TAPER=2
1230 SLANTFLAG=1:IF TYPE>4 THEN SLANTF
LAG=2:IF TYPE>8 THEN SLANTFLAG=3
1240 SLANT=0:IF SLANTFLAG=2 THEN SLANT
=1
1249 REM LOAD RANDOM LENGTHS OF SPIKES
 INTO ARRAY
1250 ON TAPER GOTO 1260,1270
1260 FOR I=1 TO 84/ST:SPIKE(I)=((84-(S
T*I))/3)*RND(0):NEXT I:GOTO 1280
1270 FOR I=1 TO 84/ST:SPIKE(I)=20*RND(
0):NEXT I
1280 POKE 77,0
1290 GOTO 100
1300 END
```

TYPO TABLE

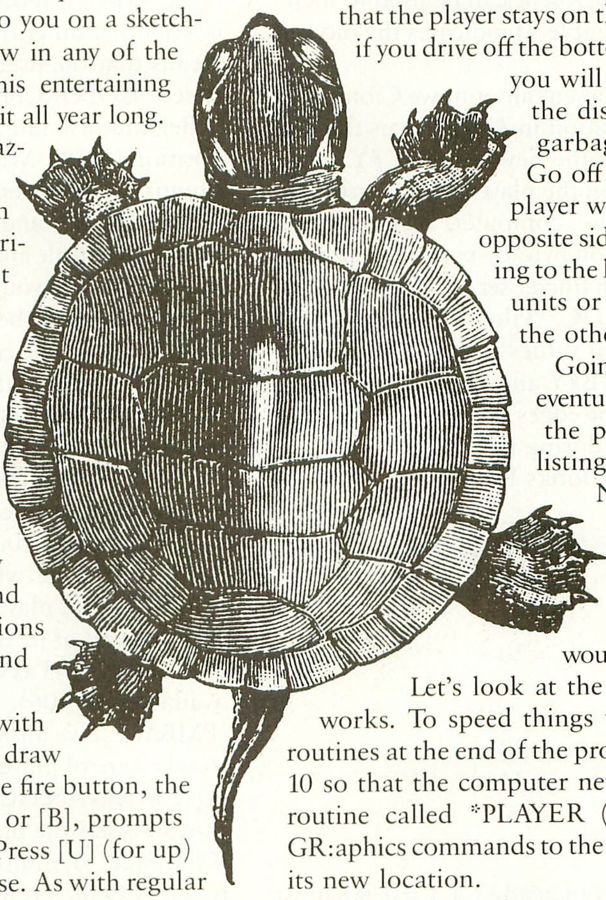
Variable checksum = 730205

Line num range	Code	Length
0 – 129	IN	502
130 – 240	MR	359
250 – 1040	TL	511
1050 – 1070	DH	529
1080 – 1150	WN	538
1160 – 1230	ZG	553
1240 – 1300	AY	286

TURTLE SKETCHPAD

COAX HER OUT OF HER SHELL

by KATHY and PHIL BERGH



"Yes, Virginia, there *is* a turtle." And just to prove it, we've coaxed her (or is it he?) to show herself to you on a sketchpad that lets you use the joystick to draw in any of the turtle's regular colors. We hope that this entertaining "tool" will be so fun that you'll play with it all year long. Although it is only 128 lines long, this amazing little program will show you how to read the joystick, get input directly from the keyboard, and move a player both horizontally and vertically using PMG but without using a machine language routine!

We know what you're thinking: next, they'll claim that they're rewriting Missile Command in PILOT. We may, someday, but for our present purposes we don't need speed, just a shape that will let us see where the cursor is without interfering with the design. Leaving PILOT is not necessary. We need only C:ompute the new location values and character shape into the RAM locations PILOT uses to create the screen image, and we're set.

When RUN, SketchPad presents you with a title page, which then directs you to draw using a joystick in Port 1. If you press the fire button, the turtle fills as it draws. Pressing [R], [Y], or [B], prompts turtle to use a red, yellow, or blue pen. Press [U] (for up) to move without drawing, and [E] to erase. As with regular turtle graphics, you cannot fill while erasing. So that you know where the turtle is at all times, a PMG player is positioned in the same location as the turtle, and shadows it wherever it goes.

This winter season brings back those coding elves of the North (Puyallup, Washington, that is), Kathy and Phil Bergh. Their "Turtle SketchPad" program is a tour de force that integrates PILOT and Player/Missile graphics (PMG). PMG mechanics have been fully covered in other ANTIC articles; I have also found Educational Software's "Tricky Tutorial' on the subject to be excellent. But for this program, just type away; it works fine. —Ken Harms

Our program does not check the cursor location to ensure that the player stays on the screen at all times. As a result, if you drive off the bottom of the screen and keep going, you will eventually poke the player into the display list and get quite a bit of garbage on the screen.

Go off the side of the screen, and the player will quickly return to the screen's opposite side, but the turtle will keep marching to the left (or right) for another 32,748 units or so before starting back toward the other side of the screen.

Going off the top of the screen will — eventually — march your player through the program memory and alter the listing beyond recognition.

Now that you know why you should stay on the screen, you may think about ways in which you can keep the turtle from leaving it. Adding that code would be good programming practice.

Let's look at the listing and see how SketchPad works. To speed things up, we've placed the least-used routines at the end of the program. We J:ump to them in line 10 so that the computer never has to see them again. The routine called *PLAYER (starting at line 20) gives the GR:aphics commands to the turtle and POKEs the player into its new location.

First, we keep the trigger value for Port 1 (%T8) as a variable. A zero here means that the fire button has not been pushed. A one means that it has. We "froze" %T8 into variable #T so that the value won't change if you stop firing midway through the routine.

Line 40 is executed if the trigger is not pressed *or* if the pen is set to erase. To determine if the pen is set to erase, look into the special memory location where PILOT stores the current pen color — @B1363. A zero here means erase, one means red, two means yellow, and three means blue. The command is executed if *either* of the conditions is true. This tells the turtle to draw to its new location (as decided by another routine).

continued on next page

The turtle's present coordinates are contained in PILOT machine variables %X and %Y. Adding #B to the current location in %X gives us the new horizontal coordinate. By using the same simple step, but this time subtracting #A from %Y, we can produce the new vertical position. The NORTH, SOUTH, etc. routines C:ompute values into #B and #A, depending on the joystick location.

Line 50 tells the turtle to fill to the same new location, if the trigger is pressed *and* the pen is not set to erase. (Multiplying conditions means they all must be true for the command to operate.)

Next, we'll show you how to move the player and stay with the turtle. Remember that #A is the change in the vertical position. Since the player moves vertically in half-steps, we must multiply #A by two (Line 60) before it can be used to increment the player's position. Variable #J indicates the old vertical position of the player.

Line 70 adds the player-movement amount we C:omputed in line 60 to the old player position in #J to give us the new player location. Line 80 stores the new value as #Y.

Ready for the fun part? When the player moves vertically, it must be moved within the computer memory, and C:omputed into the new location byte-by-byte. This process is just like C:omputing a new character set into RAM (which was explained in detail in ANTIC, "Pilot Your Atari," page 37, August 1983). The decimal values for each line within the player are C:omputed into B#Y and the next nine bytes in lines 90–270. The zeros at the edges of the player are used to erase any piece left behind during the move.

To the computer, our player looks like this:

Binary	Decimal
00000000	= 0
00000000	= 0
00100010	= 34
00010100	= 20
00001000	= 8
00001000	= 8
00010100	= 20
00100010	= 34
00000000	= 0
00000000	= 0

Because PILOT will not accept C:@B#Y + 1 = 0, we must increment the byte in one line and C:ompute the value into the next.

Horizontal movement is easy. Just add the change in position (#B) to the old position (#X) and C:ompute the new value into B53248, which is the horizontal position register for player zero. Atari's powerful graphics chip, ANTIC, takes care of horizontal travel. Lines 300 and 310 reset the values of #A and #B (our position changes) for the next time through the loop.

In line 320, we remind the turtle which color she is supposed to draw or fill with by C:omputing #C into B1363. The #C is set by *COLORCHANGE at lines 850 through 960. B764 holds the internal hardware value for the last key pressed. If that key is a [Y], [B], [R], [E], [U], or [CTRL C], the proper GR:aphics command will be executed. Line 930 "rings the internal bell" if any one of the command letters has been pressed.

Remember to press [ESC] before pressing [CTRL] and [2] when typing this line. The new pen color is stored in #C, and B764 is reset with a 255 so that it's ready to be checked for new input.

The *MAINLINE routine that starts at line 330 puts a zero into B77 (the attract flag) to keep the screen colors from changing. Normally, they rotate to protect the screen if no input is entered on the keyboard within nine minutes. This kind of protection is required whenever you use joysticks for input. Next, *MAINLINE checks the keyboard @B764 to see if there is a number other than 255 there. A number other than 255 means that the user wants to change pens, so the program U:ses *COLORCHANGE.

Beginning at line 360, *MAINLINE A:ccepts the joystick position (%J0), M:atches it against its possible values, and J:umps to whichever routine correctly C:omputes the changes in position (#A and #B). We then J:ump back to *PLAYER to move the turtle and player, and start through the cycle again. Be careful when you type line 370. For each value to be significant, there must be a space both before and after it! If you do not include the comment at the end of line 370, you must add an underline after the five at the end of the line.

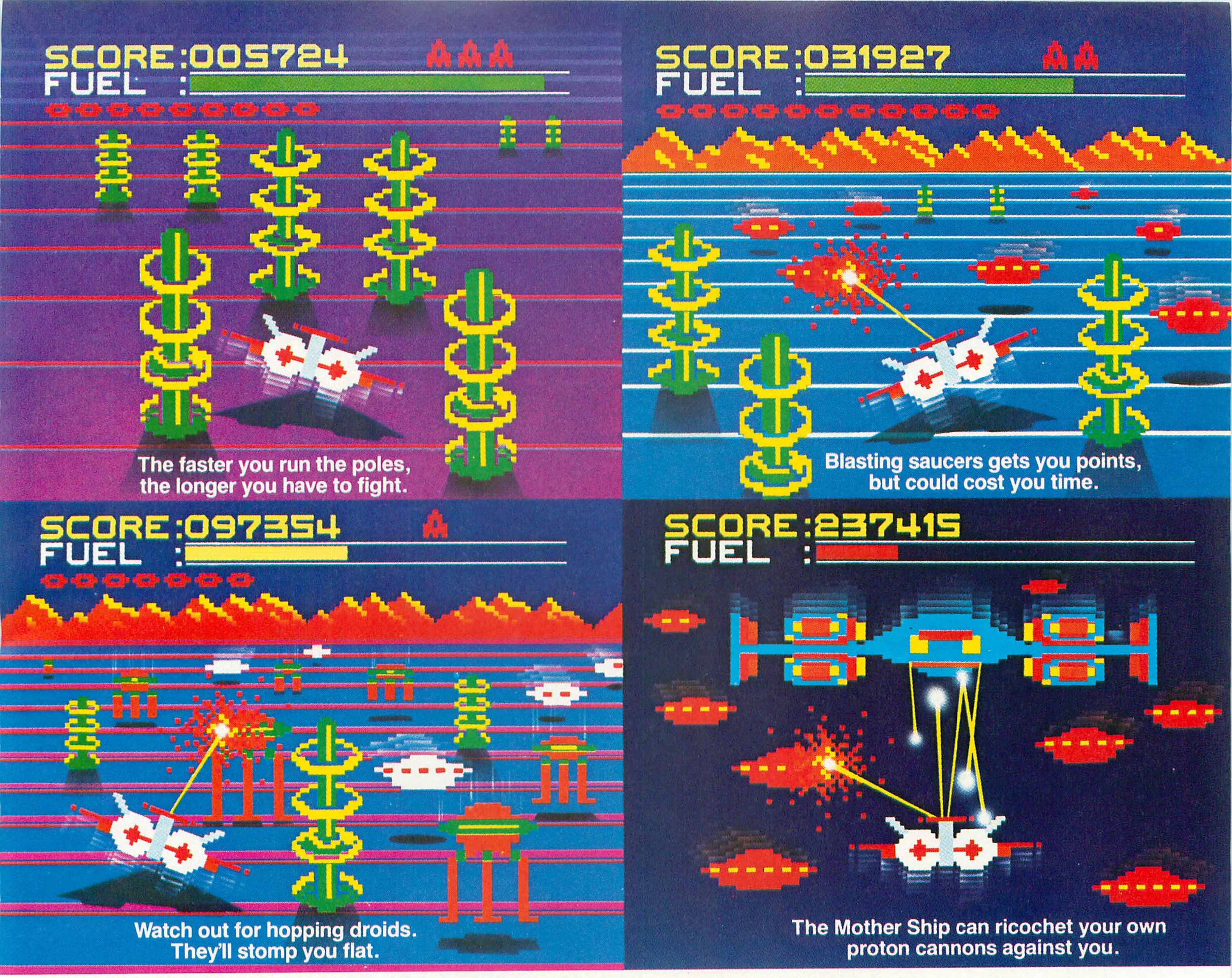
*SETUP (starting at line 600) contains the heart of the PMG. After clearing the screen, setting the pen color and turtle position, saving the initial pen color as #C, and T:yping "please wait," we need to initialize the player. First, we must enable the PMG routines. C:omputing a 62 into B559 tells ANTIC that we will be using PMG and that we want a standard-sized playfield, players and missiles (although we won't use all of them), as well as one-line player resolution.

By defining #I as 6K less than the real amount of memory available (@B106), and POKEing that value into B54279 (PMBASE), we allow ANTIC to use the top 6K of memory to take care of players and missiles. C:omputing a zero into B53256 tells ANTIC that the player is normal-sized (line 680). Line 690 sets the player's original byte position (#J), which is the page (#I) multiplied by 256 (bytes per page) and added to 1,024 (which is how far ANTIC says player zero must be from the PM base).

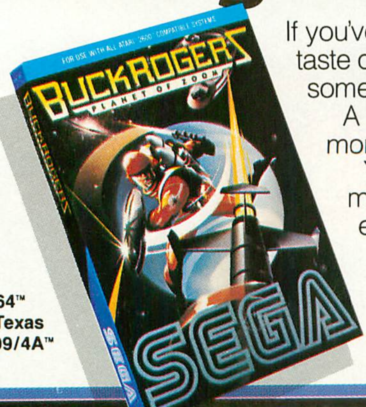
*CLEARPLAYER (line 710) keeps you from having two players on the screen if the program is being rerun. It puts a zero into the first byte of the player (#J), increments #J and a loop counter (#X), and loops through until all of the 256 bytes available to player zero are cleared.

We must then recalculate the player's original byte position and add 124 to it, so that the player will appear in the center of the screen. Putting a one into B623 tells ANTIC that the player has priority over all of the background colors. #X is set at 124, the original horizontal position of the player, and is C:omputed into B53248 to let ANTIC know where the player is.

continued on page 33



Buck Rogers, Planet of Zoom. Your one chance to defeat the toughest enemy of all. Time.



Made for:
Atari® 2600™
Atari® 5200™
Atari® Home Computers, Commodore 64™ and VIC-20,™ Texas Instruments 99/4A™

If you've played Buck Rogers, Planet of Zoom in the arcades, you've had a taste of what space chase action is all about. Now maybe you're ready for something even better.

A home game that takes the arcade version and makes it even faster, more challenging, more fun.

You'll battle your way through 3-D space. Maneuver through bullet-firing magnetic poles and alien saucers. Shoot it out with hopping droids and enemy fighters until you face the ultimate challenge, the mother ship.

But time is not on your side. You have to be fast to destroy the mother ship. If you're too slow, kiss mother goodbye.

Look for Buck Rogers at your local store. But hurry. This is one game that's really moving fast.

SEGA®
The Arcade Winners.

MMG—For When You've Got A Problem

Looks like Santa's having a little trouble with his program. MMG's Utility Programs will help organize and prevent mistakes in your programs. The MMG BASIC Debugger can find the bugs in your BASIC program so you can exterminate them. The MMG BASIC Commander is an invaluable aid to BASIC programming. Or for the ultimate in power—the combined MMG BASIC Debugger and MMG BASIC Commander.

MMG micro software



MMG Games Packages are available at your local dealer or direct from **MMG Micro Software**. Just send check or money order to:

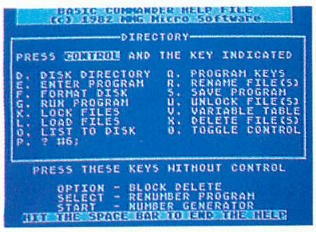
P.O. Box 131
Marlboro, NJ 07746

Or for MasterCard, Visa, and C.O.D. deliveries call:

(201) 431-3472

Please add $3.00 for postage and handling. New Jersey residents add 6% sales tax.

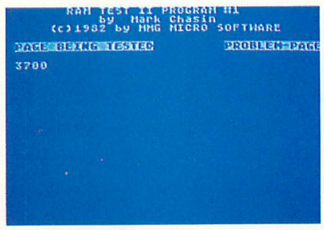
Useful Utility Programs from MMG!



MMG BASIC COMMANDER

The ATARI BASIC language was developed to fit into one 8K cartridge. To do this, many features were left out. MMG BASIC COMMANDER puts them back, and adds capabilities found only on much larger computers. Single keystrokes enable you to LIST, SAVE, ENTER, LOAD, or RUN files from your disk. DOS functions are also accessed by a single keystroke. You never need to type DOS again! View the entire disk directory, RENAME, DELETE, LOCK, UNLOCK, even FORMAT disks from BASIC! If we've omitted your favorite commands, MMG BASIC COMMANDER provides 3 programmable keys, as well as many other functions. AUTOMATIC LINE NUMBERING, which will speed program entry from 25-75%; BLOCK DELETE, to delete any range of lines instantaneously with no keyboard lockup; and, RENUMBERING any BASIC program, both line numbers and references. Extensive error trapping. Finally, none of page 6 is used, leaving it free for your use. MMG BASIC COMMANDER, THE SINGLE MOST POWERFUL PROGRAMMING AID AVAILABLE FOR ATARI BASIC! Available only on disk for ATARI.

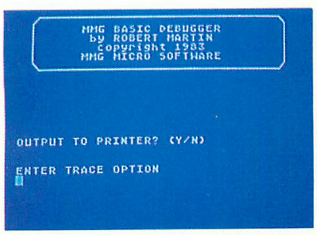
16K $34.95



MMG RAM TEST II

You're working late one night, trying to complete that program you've been working on forever, but things keep going wrong. You can't put your finger on it, but you're sure it's not you. Maybe your computer? MMG RAM TEST II will tell you whether your computer has a problem. Although the failure rate of the memory chips in your ATARI is low, chips do fail from time to time. MMG RAM TEST II can pinpoint the problem, and allow quick repairs. It's by far the fastest and most thorough memory testing program available for the ATARI, and the only one which will also test the top 8K of a 48K ATARI, since it's written entirely in machine language, and doesn't require the BASIC cartridge. Test all of a 48K ATARI in just over 4 minutes! Not only does MMG RAM TEST II test every memory location with every possible combination of bits, but it also checks for memory addressing problems as well, something no other test does! If all is well, your screen turns green; if not, the specific memory locations found to be bad are printed to the screen, the screen turns red, and a tone sounds to inform you. The test does not stop upon finding a bad location, but testing continues to the end of RAM. Available on disk or tape for ATARI only.

16K $29.95



MMG BASIC DEBUGGER

MMG BASIC DEBUGGER, the companion product to MMG BASIC COMMANDER, is an all machine-language program which is co-resident with your BASIC program. Whereas MMG BASIC COMMANDER is primarily a program writing aid, MMG BASIC DEBUGGER will dramatically simplify the task of debugging your BASIC program. A partial list of the features of MMG BASIC DEBUGGER are as follows:

1.) Trace - Single step through your BASIC program. Trace while or until a variable reaches a certain value RUN to then TRACE.

2.) Full screen editing - Provides the ability to scroll your program up or down by moving the cursor.

3.) Split screen mode - See 2 parts of your program at once. Scroll each window independently, up or down, and edit each part individually!

4.) Cross reference - Provides an alphabetical list of all variables used in your program and the line numbers they appear on.

5.) Search capability - Search your BASIC program for any phrase, command, or string of characters.

Available only on disk for ATARI.

24K $34.95



MMG GRAPHIC TITLER

The MMG GRAPHIC TITLER is used to create a wide variety of screen displays and sounds. These displays can incorporate various size text and multicolored high resolution graphics screens. The display sequences can be used as a title generator for home video movies or as a message display board to sell or demonstrate a product. The display sequences can be made to repeat making them useful for teaching or entertaining young children. Commands are provided to make it easy and fun to paint your own high resolution graphics screens. These screens can be saved, changed and incorporated into display sequences.

Graphics screens and titles that scroll horizontally or vertically can be incorporated into your own BASIC programs.

Detailed step by step instructions and many ready to run examples included on the program diskette make MMG GRAPHIC TITLER simple to use. Available on disk only for ATARI.

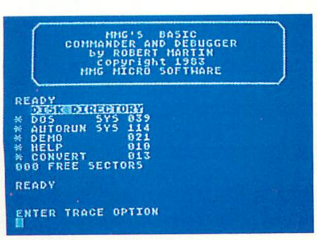
32K $32.95



MMG DISK COMMANDER II

No more going to DOS to remember what was on each disk! No more long lists of what games are where! Start any BASIC or Machine Language program by typing a single number! MMG DISK COMMANDER II is here! MMG DISK COMMANDER II consists of two programs, an AUTORUN.SYS and the DISKCOMM file, which can be transferred to each of your disks. Then, when you boot up your ATARI with any of these disks, your TV or monitor screen will introduce MMG DISK COMMANDER II. MMG DISK COMMANDER II will then tell you how much room you have left on that disk, and will list to your screen all of the programs on that disk, and allow you to run any of them by simply typing a single number. This program is ideal for new computer owners, or those with small children who will be using the computer for education or games. It will load BASIC or machine language programs and RUN them, and if you attempt to RUN a nonexecutable file, extensive error trapping will prevent system crashes. Further customization is described in the manual, which will allow even novices to create a highly individualized version of MMG DISK COMMANDER II. Available only on disk for ATARI.

16K $29.95



MMG BASIC COMMANDER & BASIC DEBUGGER

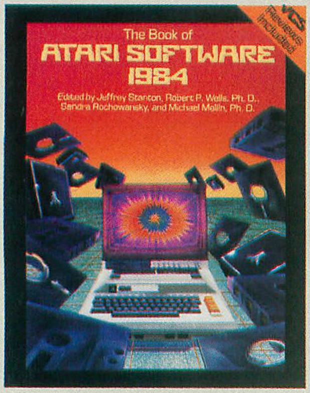
Together On The Same Disk!!!

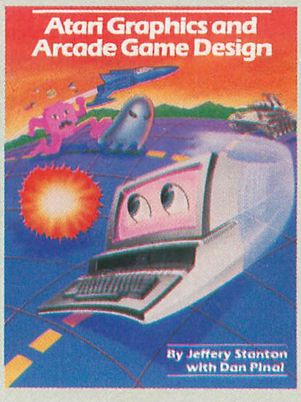
YES! Now available together on the same disk! No more swapping disks back and forth between MMG BASIC COMMANDER and MMG BASIC DEBUGGER. Just boot the disk and you're ready to go! Complete instructions are included.

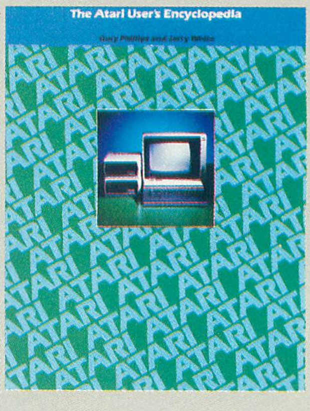
For a description of both programs, see MMG BASIC COMMANDER and MMG BASIC DEBUGGER listed above. Available only on disk for ATARI.

24K $72.95

IF YOU OWN AN ATARI, YOU'LL WANT THESE BOOKS.







THE BOOK OF ATARI SOFTWARE 1984

If you're buying software, this book will save you many hours of searching and lots of money, too.

The Book of Atari Software 1984 contains hundreds of incisive reviews—not just listings—in areas such as Games, Business, Education and Word Processing. Each evaluation gives you all the hard facts (such as price, hardware requirements, language, etc). Plus ratings in categories like Ease of Use, Reliability and Value for Money.

One of the smartest buys you'll ever make as an Atari owner.

ATARI GRAPHICS AND ARCADE GAME DESIGN

Computer games have become very big business. And good game authors are reaping large rewards.

If you want to begin to understand and create arcade games, this is the best place to start.

Jeffrey Stanton, a master of 3-D graphics, takes you from game concept through player-missile and character set animation techniques at the machine language level. Stanton also covers BASIC language programming with machine language subroutines, custom display lists, GTIA color, and sound. Arcade game concepts like maze theory, scoring, explosions and bomb drops are covered in both single screen and scrolling games.

THE ATARI USER'S ENCYCLOPEDIA

If you're a computer owner, you're always going to have questions. The best place to get answers is from **The Atari User's Encyclopedia**—the ultimate source book.

It presents hard to find information and organizes it alphabetically in an easy-to-use, results-oriented way. You'll find out everything you need to know about DOS, BASIC, programming, user's groups, software and peripherals (including a complete listing of manufacturers).

This book is as indispensable to your Atari as the power cord.

Material covers all models except 2600 (VCS) and 5200.

TIPS ON BUYING SOFTWARE

Send for your free 64 page booklet, **"Tips on Buying Software."** You'll learn how to evaluate your needs and find out what's available. Plus much more.

THE BOOK COMPANY
A Division of Arrays, Inc.

Available at computer stores everywhere or directly from The Book Company.

	Title	Qty.	Price	Total
	The Book of Atari Software 1984		$19.95	
	Atari Graphics and Arcade Game Design		$16.95	
	The Atari User's Encyclopedia		$19.95	
	Tips on Buying Software		N/C	

Mail to: THE BOOK COMPANY, Dept. ANT, 11223 S. Hindry Avenue, Los Angeles, CA 90045. Or call toll free in California 800/441-2345, ext. 518. Outside California in the continental U.S. call 800/556-1234, ext. 518.

Name

Address

City State Zip

Visa, MasterCard, Check or Money Order accepted.

Card #

☐ Visa ☐ MasterCard Exp. Date Signature

Total Amount Enclosed $ California residents add 6% sales tax.

Postage will be paid by The Book Company.

Atari 2600 and 5200 are registered trademarks of Atari, Inc., a division of Warner Communications, Inc.

TURTLE SKETCH PAD *continued from page 29*

(Clearplayer prevents two players from appearing when you re-RUN the program. If you [BREAK] the program and attempt to clear the screen, however, the screen will fill with garbage. Just hit [RESET]. —KWH)

The player's color is set to white (line 800) and the players are lit up by C:omputing a three into B53277. A zero here makes the player disappear. Now, all of our housekeeping is finished, and our player is ready to go!

The remainder of the program types the instructions and the title page. This section is followed by a set of R:emark statements that list the variables used and what they mean. (Including a table like this in a program is a very good habit to form. A few weeks — or even a few days — after you have written a program, you may wish to modify it. Being reminded which variables are available for use, and which ones have been defined, is a real time-saver.)

In conclusion, we hope that you have a New Year full of fun designing with Sketchpad and writing Player/Missile graphics programs of your own. Good luck!

Next month, it's back to Logo for a look at a wide range of books and resource materials that are available for home and school.

```
10 J:*TITLEPAGE
20 *PLAYER [THE PLAYER IS AN "X"
30 C:#T=%T8 [KEEP TRIGGER VALUE AS A VARIABLE
40 GR(#T=0)+(@B1363=0):DRAWTO %X+#B,%Y-#A [DRAW IF TRIGGER NOT PRESSED OR PEN IS ERASE
50 GR(#T=1)*(@B1363<>0):FILLTO %X+#B,%Y-#A [FILL IF TRIGGER PRESSED AND NOT ERASE
60 C:#A=#A*2 [SCALING FACTOR
70 C:#J=#J+#A [COMPUTE NEW VERTICAL VALUE FOR PLAYER
80 C:#Y=#J [KEEP IT AS #Y
90 C:@B#Y=0  [THROUGH LINE 270 - MOVE PLAYER TO NEW VERTICAL POSITION
100 C:#Y=#J+1
110 C:@B#Y=0
120 C:#Y=#J+2
130 C:@B#Y=34
140 C:#Y=#J+3
150 C:@B#Y=20
160 C:#Y=#J+4
170 C:@B#Y=8
180 C:#Y=#J+5
190 C:@B#Y=8
200 C:#Y=#J+6
210 C:@B#Y=20
220 C:#Y=#J+7
230 C:@B#Y=34
240 C:#Y=#J+8
250 C:@B#Y=0
260 C:#Y=#J+9
270 C:@B#Y=0
280 C:#X=#X+#B [COMPUTE NEW HORIZONTAL POSITION
290 C:@B53248=#X [POKE IT INTO PLAYER/MISSLE BASE
300 C:#A=0 [RESET A
310 C:#B=0 [RESET B
320 C:@B1363=#C [POKE REMINDER OF WHICH PEN TO USE
330 *MAINLINE [CHECKS JOYSTICK
340 C:@B77=0 [SET ATTRACT FLAG TO KEEP SCREEN FROM CHANGING COLORS
350 U(@B764<255):*COLORCHANGE [CHANGE COLOR IF THERE IS KEYBOARD IMPUT
360 A:=%J0 [GRAB VALUE OF JOYSTICK
370 M: 1 , 9 , 8 , 10 , 2 , 6 , 4 , 5 [MATCH VALUE OF JOYSTICK
380 JM:*NORTH,*NE,*EAST,*SE,*SOUTH,*SW,*WEST,*NW [JUMP TO APPROPRIATE ROUTINE FOR DIRECTION TRAVELED
390 J:*MAINLINE      [THROUGH LINE 690-
400 *NORTH C:#A=-1   [COMPUTE NEW
410 J:*PLAYER        [POSITION IN
420 *NE C:#A=-1      [APPROPRIATE
430 C:#B=1           [DIRECTION
440 J:*PLAYER
450 *EAST C:#B=1
460 J:*PLAYER
470 *SE C:#A=1
480 C:#B=1
490 J:*PLAYER
500 *SOUTH C:#A=1
510 J:*PLAYER
520 *SW C:#A=1
530 C:#B=-1
540 J:*PLAYER
550 *WEST C:#B=-1
560 J:*PLAYER
570 *NW C:#A=-1
580 C:#B=-1
590 J:*PLAYER [JUMP BACK TO MOVE PLAYER AND DRAW LINE
600 *SETUP [SET UP PLAYER/MISSLE GRAPHICS
610 GR:CLEAR;GOTO 0,0;PEN YELLOW
620 C:#C=@B1363 [PUT CURRENT PEN VALUE IN #C
630 T:
640 T:   INITIALIZING ...... PLEASE WAIT
650 C:@B559=62 [ENABLE PMG(32)+ONE LINE PLAYER RES.(16)+USE PLAYERS & MISSILES(12)+STANDARD PLAYFIELD(2)
660 C:#I=@B106-24 [RESERVE 6K FOR PMG
```

continued on next page

```
67Ø C:@B54279=#I [PMBASE
68Ø C:@B53256=Ø  [SIZE OF PLAYER Ø - N
ORMAL, 1 - DOUBLE, 3 - QUAD. (2=Ø)
69Ø C:#J=#I*256+1Ø24 [ADDRESS OF PLAYE
R'S 256 BYTES
7ØØ C:#X=Ø [#X IS TEMPORARILY A LOOP C
OUNTER
71Ø *CLEARPLAYER
72Ø C:@B#J=Ø
73Ø C:#X=#X+1
74Ø C:#J=#J+1
75Ø J(#X<256):*CLEARPLAYER
76Ø C:#J=#I*256+1Ø24+124 [ADDRESS OF P
LAYER Ø IN RAM
77Ø C:@B623=1 [PRIORITY SELECTION - PL
AYER Ø -3 HAS PRIORITY OVER ALL THREE
BACKGROUND COLORS
78Ø C:#X=124
79Ø C:@B53248=124 [PLAYER Ø HORIZONTAL
 POSITION
8ØØ C:@B7Ø4=14
81Ø C:@B53277=3  [2 TURN ON PLAYER + 1
 TURN ON MISSLES
82Ø T:⊠
83Ø U:*INSTRUCTIONS
84Ø J:*PLAYER
85Ø *COLORCHANGE
86Ø GR(@B764=11):PEN UP   [CHANGE PEN
USED UPON KEYBOARD INPUT
87Ø GR(@B764=21):PEN BLUE
88Ø GR(@B764=4Ø):PEN RED
89Ø GR(@B764=42):PEN ERASE
9ØØ GR(@B764=43):PEN YELLOW
91Ø GR(@B764=146):PEN YELLOW;CLEAR
92Ø U(@B764=146):*INSTRUCTIONS
93Ø T(@B764=21)+(@B764=4Ø)+(@B764=42)+
(@B764=11)+(@B764=43)+(@B764=146):⊠\
94Ø C:#C=@B1363   [SAVE NEW PEN VALUE
95Ø C:@B764=255  [RESET KEYBOARD BUFFE
R
96Ø E:
97Ø *INSTRUCTIONS
98Ø T: R - PEN RED          U - PEN UP
99Ø T: B - PEN BLUE         E - ERASE
1ØØØ T: Y - PEN YELLOW      CTRL C - CL
EAR
1Ø1Ø E:
1Ø2Ø *TITLEPAGE
1Ø3Ø GR:QUIT
1Ø4Ø POS:11,5
1Ø5Ø T:TURTLE SKETCHPAD
1Ø6Ø POS:12,8
1Ø7Ø T:ANTIC Volume 2
1Ø8Ø POS:15,9
1Ø9Ø T:Issue 9
11ØØ R:BY KATHY AND PHIL BERGH
111Ø POS:2,14
112Ø T:      DRAW using a joystick in P
ort 1. To FILL, press the trigger. You
 change the PEN colors by \
113Ø T:pressing R for RED, B for BLUE,
Y for YELLOW, U for UP, and E for ERA
SE. You need not press return. \
114Ø T:To CLEAR the screen, press CON
TROL and C.
115Ø POS:6,22
116Ø T:Press RETURN to continue \
117Ø A:
118Ø J:*SETUP
119Ø R:******************************
12ØØ R:VARIABLES:
121Ø R:      #X - HORIZONTAL POSITION OF
                  PLAYER
122Ø R:      #Y - VERTICAL POSITION OF
                  PLAYER
123Ø R:      #I - PAGE NUMBER OF PMBASE
124Ø R:      #J - ADDRESS OF PLAYER Ø IN
                  RAM
125Ø R:      #A - VERTICAL POSITION
                  INCREMENT
126Ø R:      #B - HORIZONTAL POSITION
                  INCREMENT
127Ø R:      #C - SAVED VALUE OF THE
                  COLOR REGISTER IN USE
128Ø R:      #T - SAVED VALUE OF TRIGGER
```

If you are serious about personal finance...

- **Budget Forecast** – 26 expense categories
- **Check Entry** – easy data entry – scan & modify 26 major & 36 sub-categories – information block
- **Check Search** – single or multiple parameters – (up to seven) to search entries
- **Tabulations** – detailed expense vs. budget comparisons by month, year-to-date, category
- **Bar Graphs** – screen displays in graph form expenses vs. budget – by month or category – printing with graphic capable printers
- **Check Reconciliation** – fast clearing of resident checks & deposits, complete summary report
- **Checkwriter** – prints your custom checks
- **Printouts** – most popular printers
- **Multi-Colored Graphics • Audio Enhancements**
- **7 Utility Programs • User-Friendly Operation**
- **Easy To Use Instruction Manual • Audit Report**
- **Handsome Tinted Plastic Storage Case**



NEW ! : 1.5d version includes two new report generating programs - CHECK REGISTER & CHECK LEDGER !

COMPUTE!
The Leading Magazine Of Home, Educational, And Recreational Computing

In a feature editorial.

"If you want to use a finance system, but don't want to spend several days trying to learn how to use one, then A Financial Wizard by Computari may be just what you need."

"The illustrated manual that comes with this program is clear, direct, and very thorough."

"It appears that this finance system was designed to achieve the best and most comfortable working relationship between the user and the program."

"The check entry routine is the most attractive feature of this finance system. Data prompts are very clear and the category item names are displayed at all times during data entry for your convenience."

"The file search capabilities of this program are superior. You are offered seven ways to look up the checks."

"The system is disk intensive. All data is saved automatically and immediately following all routines that either enter data or modify it."

"Scanning your entries is made possible by pressing START. You can see records very quickly this way."

"This is an excellent finance system – entertaining, accurate, and fun to use."

ANALOG COMPUTING
THE MAGAZINE FOR ATARI COMPUTER OWNERS

Analog Magazine in a comprehensive study of personal finance systems for Atari* computers.

"A Financial Wizard from Computari is by far the best of these programs and will be the standard of comparison for the others."

"The check entry mode is easy to use..."

"The way a Financial Wizard handles your tabulations is excellent. You can chart your actual expenses vs. your budget by month, by category or year to date."

"...where it really outshines the rest is in the check reconciliation."

"In effect it gives you your bank statement on the screen, a complete list by month of all your checks and deposits."

"A Financial Wizard has one disk that does everything..."

"Graphics, while really not a factor in the quality of programs of this type, do make your budgeting chores a little more pleasant. Again A Financial Wizard comes out on top."

"Everything about this program is excellent..."

Antic
The ATARI Resource

In a Report from Antic.

"Like most Atarians, I am captivated by the graphic, color and sound capabilities of my machine. Nothing quite discourages me more than to boot up an applications program (personal, business, etc.) and to be presented with the standard graphic 'o' white characters on a blue screen.

Of course the usefulness and effectiveness of a program is of primary importance. However, enhancing the dullest of applications programs with some of Atari's charms, is a great asset. A Financial Wizard, a personal finance program by Computari's Bill McLachlan, is an excellent example of an applications program that integrates many of the Atari's features into a well conceived and executed program."

"The use of color and sound in the data input prompts and error checking routines are so well done that it's quite simple to boot up the disk, follow along with the very clear documentation, and be 'up and running' in short order."

"I give A Financial Wizard high marks in ease of use, documentation and performance. If a disk-based home finance package is in your future, The Wizard should get serious consideration."

Computari's
A Financial Wizard 1.5
The logical choice.

The system is designed for Atari computers having a minimum of 32K and operating from a disk drive. The cost is only $59.95 plus $3 for handling/postage.

If your dealer does not have **A Financial Wizard** . . . Telephone orders are accepted on Mastercharge or Visa credit cards. Mail order must be accompanied by check or money-order or credit card #.

Dealer inquiries invited.

*trademark of Atari Inc.

OK residents ad 4% Tax.

Exclusively thru **ON LINE** COMPUTER CENTERS of OKC (405)751-7925

10944 North May, Oklahoma City, OK 73120

CHECK ENCLOSED VISA MASTERCHARGE

NAME (Print) ______________________

Address ______________________

City ______________________

State ______________ Zip ________

Card # ______________ Exp. ________

Signature ______________________

ODD MAN REFORMS

Character redefinition techniques

by JOHN and MARY HARRISON

Last month we described **Odd Man Out**, an educational game designed to help preschool children develop visual discrimination skills. This month, we will look at the initial stages of the program for Odd Man Out and the special features of the Atari computers that make the creation of the program so simple.

WHAT IS A CHARACTER?

The basis for Odd Man Out is the ability to easily redefine the Atari character set. Once this skill is mastered, the rest is easy, since most of the program involves the manipulation of characters to create desired displays. This may sound mysterious, but it is quite simple. With that in mind, let's look at how the Atari creates the characters of the alphabet.

Turn on your computer and examine the characters displayed on the screen. If you look closely, you'll see that each character is composed of a series of dots; every character in the Atari character set is defined by an eight-by-eight dot matrix. In terms of computer memory, each character is represented by eight bytes, one byte for each row of dots in the character.

The computer interprets each byte as a series of ones and zeros. If the individual bit is a one, the computer places a dot on the screen.

Suppose the value of one byte of a character is 24. This is stored in your computer as 00011000, since computers only recognize binary numbers. When your Atari encounters this byte, it interprets it by lighting dots that correspond to the 1's, which creates a pattern on the screen. A series of eight such bytes could create something like this:

```
00011000       XX
00111100      XXXX
01100110     XX  XX
01100110 →   XX  XX
01111110     XXXXXX
01111110     XXXXXX
01100110     XX  XX
00000000
```

Armed with this knowledge, we can begin to develop our own character set.

CONSTRUCTING A CUSTOM CHARACTER SET

Let's examine one of the objects to be displayed in level 1 of Odd Man Out. In order to make the objects large enough to be identified by young children, we decided to form each object by combining four characters in a two by two matrix.

The house is divided into four sections, with each section representing one character. Converting this picture into its numerical representation results in the following:

Upper left section – 1,2,4,8,16,32,63,32
Upper right section – 128,64,32,16,8,4,252,4
Lower left section – 32,32,35,34,34,34,34,63
Lower right section – 4,4,196,68,68,68,68,252

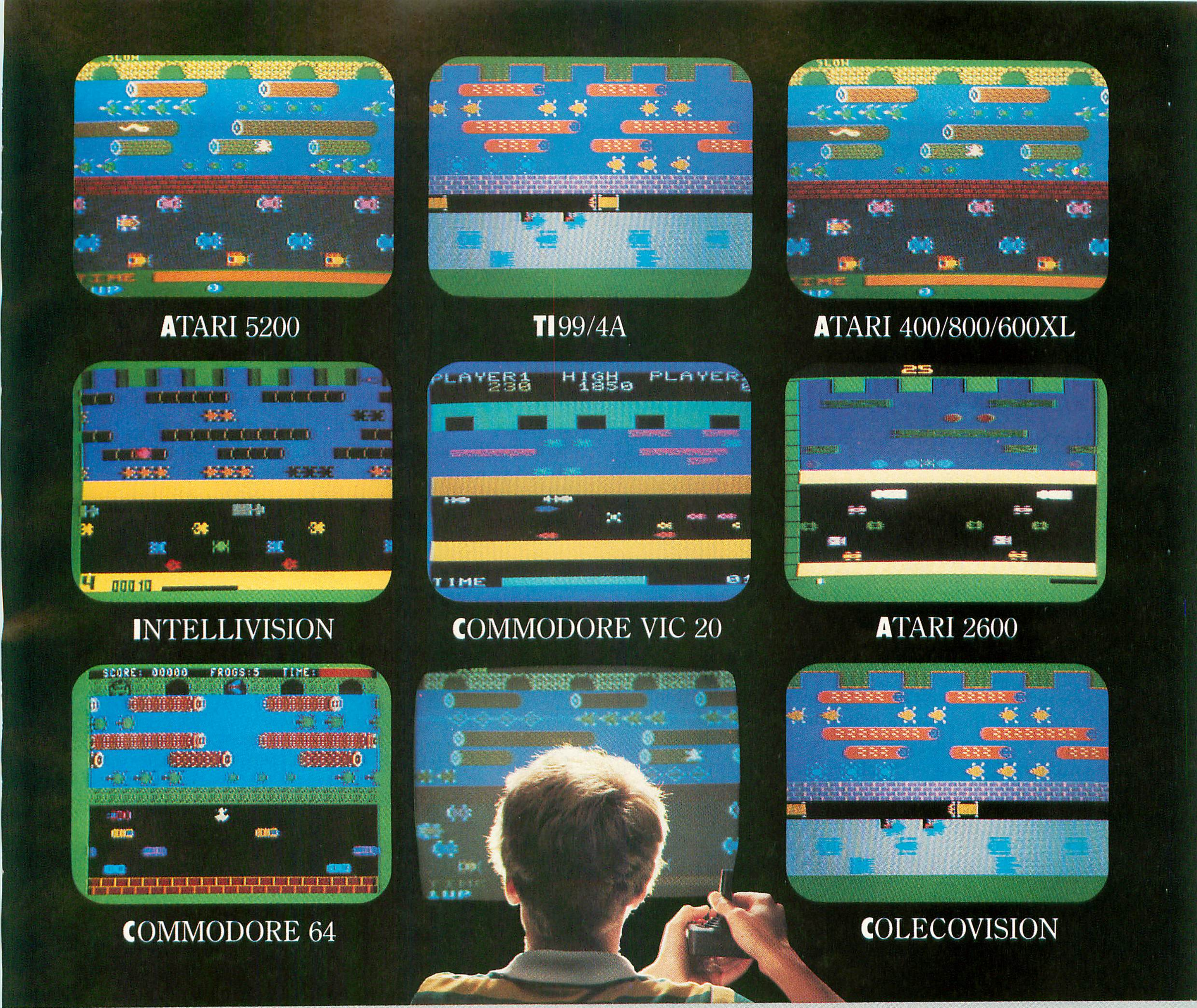
Each of the objects displayed in the first three levels of the game was created in this manner. We drew our characters by hand and calculated the proper numerical values ourselves, but several commercial products let you create your characters on the screen rather than on graph paper.

CHANGING CHARACTER SETS

The standard character set requires four pages of memory. (There are 128 characters in the set, each of which is represented by eight bytes. Each page of memory contains 256 bytes. Thus, 128 characters × eight bytes per character/256 bytes per page = four pages.)

Now that we have defined a new character set, we need to store it at the beginning of a memory page. To accomplish this, we can use memory location 106, which is the pointer to the top of RAM (Random Access Memory). There is no memory available at the page pointed to by location 106. Because of this, we can fool the computer into thinking there

continued on page 38



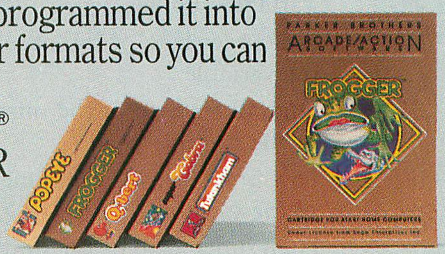
8 WAYS YOU CAN PLAY FROGGER*™ AT YOUR PAD.



FROGGER is one of the all-time great award-winning home video games. And now Parker Brothers has programmed it into all the most popular video and computer formats so you can keep things hopping in your own home.

Catch Frogger along with POPEYE,® Q*bert,™ TUTANKHAM™ and SUPER COBRA™ where you buy your video and computer games. You'll find it absolutely ribbitting.

® PARKER BROTHERS



ODD MAN REFORMS *continued from page 36*

is less available memory by decreasing the value stored in this location. This is exactly what we will do. However, since the computer had been using the area at the top of memory to store display information, we will need to reassign this information. To do this, we need only issue a Graphics command. Thus, we can safely reserve the four pages of memory we need by using this three-step process:

1) RAMTOP = PEEK(106)
2) POKE 106; RAMTOP – 4
3) GRAPHICS 2 (or any valid graphics command)

After we have reserved this area, the next step is to place the character set into it. The easiest and most straightforward way to accomplish this is to POKE the new character set into the area with the following program:

```
10 GRTOP = (RAMTOP–4)*256
20 FOR I = 0 TO 1023
30 READ X
40 POKE GRTOP + I,X
50 NEXT I
60 DATA ——————————————————
```

This method is simple, but it has two major disadvantages. Not only is it slow, but more importantly in order to use a number of custom character sets, as we will in this program, you need to POKE in a new character set every time you use it. So, let's look at another, more versatile method of storing our character sets.

VARIABLE AND ARRAY TABLES

The Atari keeps track of the variables that have been used in a program by means of a table that holds information on as many as 128 variables. This information consists of eight entries per variable. The first entry identifies the type of variable involved — string, array or numerical. The second entry is the variable number (the first variable in the table is number zero, the second number one, and so on). The third and fourth entries determine where the information in the variable is stored. The fifth and sixth entries form a sixteen-bit number that represents the dimensioned length of the variable. The seventh and eighth entries also form a sixteen-bit number. This represents the in-use length of the variable. Thus, the variable table we're discussing looks like this:

LOCATION	INFORMATION
VT + 0	Type of variable
VT + 1	Variable number
VT + 2	Low order byte of the offset to the value of the variable
VT + 3	High order byte of the offset to the value of the variable
VT + 4	Low order byte of the dimensioned length of the variable
VT + 5	High order byte of the dimensioned length of the variable
VT + 6	Low order byte of the in-use length of the variable
VT + 7	High order byte of the in-use length of the variable

Once the variable table has been located, we are almost able to determine where a particular value is stored. Almost. The Atari stores the actual string data in another table, the array table. The values stored in locations VT + 3 and VT + 4 of the variable table are an offset from the start of the array table. In order to find the actual location of these values, we must find the beginning of the array table and apply the offset found in the variable table. This sounds complicated, but it isn't. Two memory locations hold the addresses of these tables. We can find the beginning of the variable table by using the following:

VT = PEEK(134) + 256 * PEEK(135)

Similarly, we can find the beginning of the array table in this way:

AT = PEEK(140) + 256 * PEEK(141)

We should now have enough information to store our custom character set.

CHARACTER SET MANIPULATIONS

To use our custom character set, we need to undertake the following steps:

1) Reserve memory space
2) Locate and modify the variable table
3) Place the new character set into memory
4) Change the character set pointer

We already know how to reserve space and locate the variable table; the next step is modification of the variable table.

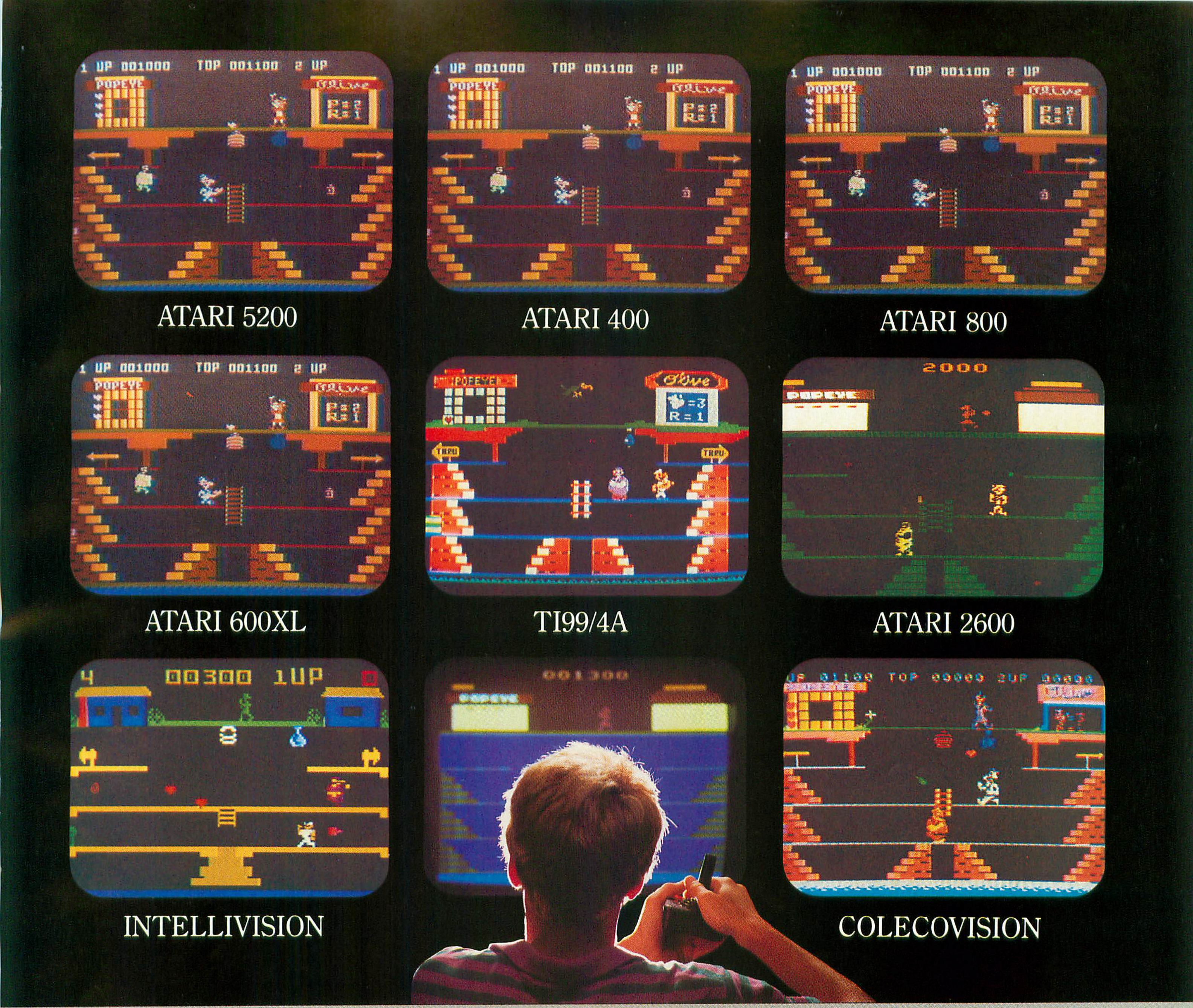
In Odd Man Out, we will be using both the standard and custom character sets to form a modified character set. We will set up two string variables, RAM$ and ROM$. ROM$ will hold the standard character set, RAM$ the modified character set. It is important that RAM$ and ROM$ be the first two variables introduced in the program. This can be accomplished by using the following as the first program statement:

```
10 DIM RAM$(1),ROM$(1)
```

This way, we know that RAM$ and ROM$ will be the first two entries in the variable table.

Even though each character set contains 1024 entries, we have purposely dimensioned these two variables to have length one, because we are going to reassign the memory locations to store this information. Had we dimensioned both variables to be 1,024 characters long, BASIC would have reserved 1024

continued on page 41



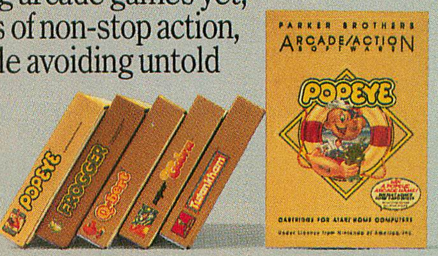
EVERYONE HAS THEIR OWN SYSTEM FOR PLAYING POPEYE.®



Atari.® Intellivision.® ColecoVision.™ T.I.™ Now you can play POPEYE, one of the most fun and challenging arcade games yet, on any one of them. Run through three screens of non-stop action, where you try to capture Olive Oyl's heart while avoiding untold dangers, including Brutus and the Sea Hag.

Run down to your local store for Popeye today. And while you're there, check out TUTANKHAM,™ FROGGER,™ Q*bert™ and SUPER COBRA,™ also from Parker Brothers' Arcade Action Series.

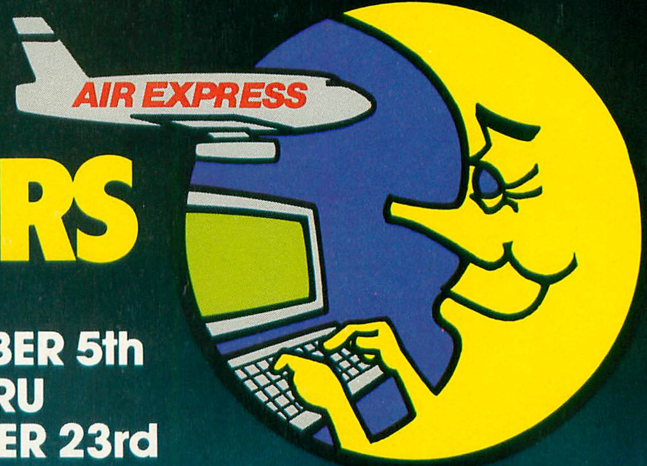
® PARKER BROTHERS



MOSAIC SPECIAL CHRISTMAS ANNOUNCEMENT

FOR ATARI® 400/800® OWNERS

THE POWER OF MOSAIC IS YOURS *Overnight*



DECEMBER 5th THRU DECEMBER 23rd

We'll ship Overnight Express directly to you at no extra charge until December 24th. Phone in your order on your VISA or Mastercard between those dates. Or call us for your nearest MOSAIC dealer for delivery *TODAY!*

64K SELECT™ FOR ATARI®

Most advanced memory board available for the Atari computers. 52K continuous RAM with 3 more banks of 4K RAM for a 64K total. 800 owners can expand to 192K RAM!

48K RAM KIT FOR ATARI® 400®

This RAM Kit expands your own Atari 16K RAM board to a full 48K RAM. Only 5 wires to solder.

EXPANDER FOR ATARI®

Converts to a 32K RAM board with the chips from one Atari 16K RAM board.

32K RAM FOR ATARI®

This is the benchmark of Atari compatible RAM boards. Slot independent, fully compatible.

MOSAIC™
ELECTRONICS, INC.

CALL 1-800-2-ADD-RAM* FOR OVERNIGHT DELIVERY OR SEE YOUR NEAREST MOSAIC DEALER.

P.O. Box 708 Oregon City, OR 97405 *In Oregon 653-7885

ODD MAN REFORMS *continued from page 38*

bytes of memory for each variable in the array table. Since this offset is not where we want those values to be stored, 2K of RAM would have been wasted. By using the above method, however, only two bytes of RAM will not be used. Now, let's make the variable table modifications.

We want to store the modified character set in the four pages of reserved memory. To do this, we need to modify the address, dimensioned length, and in-use length of the RAM$ in the variable table. Listing 1 will accomplish this.

Let's look at what this listing does. Line 10 introduces RAM$ and ROM$ and ensures that they are the first two entries in the variable table. Line 20 reserves four pages of memory for the character set. The graphics command in line 30 moves the display information out of this reserved area. Line 40 finds the locations of the variable and array tables. Line 50 converts the page number to the memory location for the start of the character set. Line 60 calculates the offset from the start of the character set to the start of the array table. This is the value that will be stored in locations two and three of the variable table. Lines 70 and 80 convert the length and offset from a decimal to a two-byte representation. Due to a bug in Atari BASIC, it is necessary to dimension the string variable to 1025 instead of 1024. Lines 90, 100, and 110 store the offset, dimensioned, and in-use lengths into the variable table.

Type in Listing 1 and RUN it. When the computer prints READY, type: PRINT LEN(RAM$). The computer should respond: 1025. Thus, even though we dimensioned RAM$ to be one character long, because we changed the variable table the computer thinks RAM$ is 1025 characters in length.

The modification for ROM$ is similar; the only change required is: OFFROM = 57344–AT. (57344 is the start of the ROM character set.) Now we are ready to read the new character set into memory.

Since we have stored the existing and modified character sets in string variables, we will use string variables to store the custom character set we have created. This will allow us to change the modified character set by simple string variable assignments. We also will set up three string variables to hold the redefined characters used in the first three levels: OBJECT$, GEO$, and E$. As a result, at the beginning of the program we can read in all the data for the redefined characters and store it in these string variables. The creation of the modified character set required for a particular level of the game will then involve only a few string variable assignment statements. Because of this, character set modifications can be accomplished very rapidly.

The Atari already has a character set stored in ROM (Read Only Memory) that displays normal text and graphics characters. When you change text modes from Graphics 0 to Graphics 1 or 2, you can access only one half of this character set. Memory location 756 serves as a pointer to the beginning of the half of the character set in use. As a result, by changing the value stored in location 756, you can change the characters used by the computer. To display lower case letters and graphics characters, you POKE 756,226. Capital letters and punctuation characters can be displayed by POKEing 756,224 (the values 226 and 224 are the page numbers that contain the start of the character set). We can also change the value stored in location 756 so that it points to the start of our custom character set.

Now, we are ready to put theory into practice. The program in Listing 2 reserves space for the modified character set (lines 20 to 200). The variable table (lines 340 to 540) reads in the redefined characters (lines 580 to 680), and displays four objects on the screen at a time (lines 1460 to 1880). To change the display, press [RETURN]. This program is the heart of Odd Man Out.

NEXT MONTH

This completes our introduction of the Atari character sets. No other microcomputer allows character sets to be manipulated so quickly and easily from BASIC.

There will be two more installments of code to complete the game. Once you have Listing 2 typed in and debugged, save it so you can add the next portion of the program next month. In our next article, we will look at joystick routines and character animation.

Listing 1

```
10 DIM RAM$(1),ROM$(1)
20 RAMTOP=PEEK(106):POKE 106,RAMTOP-4
30 GRAPHICS 0
40 VT=PEEK(134)+256*PEEK(135):AT=PEEK
(140)+256*PEEK(141)
50 GRTOP=RAMTOP-4:RAMLOC=GRTOP*256
60 OFFRAM=RAMLOC-AT
70 LENHI=INT(1025/256):LENLO=INT(1025-
(LENHI*256))
80 OFFRAMH=INT(OFFRAM/256):OFFRAML=(OF
FRAM-(OFFRAMH*256))
90 POKE VT+2,OFFRAML:POKE VT+3,OFFRAMH
100 POKE VT+4,LENLO:POKE VT+5,LENHI
110 POKE VT+6,LENLO:POKE VT+7,LENHI
```

Listing 2

```
5 REM ANTIC MAGAZINE
10 REM ****************************
20 REM *                          *
30 REM *       ODD MAN OUT        *
40 REM *           BY             *
50 REM *  JOHN AND MARY HARRISON   *
60 REM *                          *
```

continued on next page

```
70 REM *            FOR            *
80 REM *      ANTIC MAGAZINE       *
90 REM *                           *
95 REM *****************************
120 DIM RAM$(1),ROM$(1),OBJECT$(264),GEO$(264),E$(264),BOX$(16),INDEX(8)
140 DIM Z$(1)
200 MEMTOP=PEEK(106):GRTOP=MEMTOP-8:POKE 106,GRTOP:GRTOP=GRTOP+4:GRAPHICS 2
220 SETCOLOR 2,4,4:SETCOLOR 4,4,4:SETCOLOR 0,0,14:SETCOLOR 1,0,14:POKE 752,1
240 POSITION 4,2:? #6;"ODD MAN OUT"
260 POSITION 9,4:? #6;"BY"
280 POSITION 0,6:? #6;"JOHN & MARY HARRISON"
300 ? "Setting up the game, please wait."
340 AT=PEEK(140)+256*PEEK(141):VT=PEEK(134)+256*PEEK(135)
360 RAMLOC=GRTOP*256:OFFRAM=RAMLOC-AT:OFFROM=(14*4096)-AT
380 LENHI=INT(1025/256):LENLO=INT(1025-(LENHI*256))
400 OFFRAMH=INT(OFFRAM/256):OFFRAML=INT(OFFRAM-(256*OFFRAMH))
420 OFFROMH=INT(OFFROM/256):OFFROML=INT(OFFROM-(256*OFFROMH))
440 POKE VT+2,OFFRAML:POKE VT+3,OFFRAMH
460 POKE VT+4,LENLO:POKE VT+5,LENHI
480 POKE VT+6,LENLO:POKE VT+7,LENHI
500 POKE VT+10,OFFROML:POKE VT+11,OFFROMH
520 POKE VT+12,LENLO:POKE VT+13,LENHI
540 POKE VT+14,LENLO:POKE VT+15,LENHI
580 FOR I=1 TO 16:READ X:BOX$(I,I)=CHR$(X):NEXT I
620 FOR I=1 TO 256:READ X:OBJECT$(I,I)=CHR$(X):NEXT I
640 FOR I=1 TO 256:READ X:GEO$(I,I)=CHR$(X):NEXT I
660 FOR I=1 TO 256:READ X:E$(I,I)=CHR$(X):NEXT I
680 FOR I=0 TO 7:READ X:INDEX(I)=X:NEXT I
1320 RAM$=ROM$
1340 RAM$(473,488)=BOX$
1440 CHOICE=1
1460 REM SETUP GAME LEVELS I,II,III
1480 RAM$(145,208)=OBJECT$(1,64):RAM$(257,448)=OBJECT$(65,256):GOTO 1540
1540 REM PLAY GAME FOR LEVELS 1,2,3
1560 GRAPHICS 2:POKE 756,GRTOP:REM CALLUP ALTERNATE CHARACTER SET
1580 FOR I=0 TO 3:SETCOLOR I,0,14:NEXT I:SETCOLOR 4,CHOICE*2,8
1600 SETCOLOR 2,CHOICE*2,8
1620 REM POKE 16,112:POKE 53774,112
1700 FOR K=1 TO 3
1720 FOR J=0 TO 1
1740 FOR I=0 TO 3
1760 P=INDEX(I+J*4)+32
1780 POSITION I*4+3,5:? #6;CHR$(P);CHR$(P+1)
1800 POSITION I*4+3,6:? #6;CHR$(P+2);CHR$(P+3):POSITION I*4+3,8:? #6;"[":NEXT I
1820 INPUT Z$:NEXT J
1840 IF K=1 THEN RAM$(145,208)=GEO$(1,64):RAM$(257,448)=GEO$(65,256):GOTO 1880
1860 IF K=2 THEN RAM$(145,208)=E$(1,64):RAM$(257,448)=E$(65,256)
1880 NEXT K
1900 GRAPHICS 0:END
4440 REM BITMAPS
4460 DATA 255,129,129,129,129,129,129,255
4480 DATA 255,255,255,255,255,255,255,255
4620 DATA 1,1,3,3,7,255,63,31
4640 DATA 128,128,192,192,224,255,252,248
4660 DATA 15,31,63,62,120,112,64,128
4680 DATA 240,248,252,124,30,14,2,1
4700 DATA 0,1,1,3,7,3,3,7
4720 DATA 0,128,128,192,224,192,192,224
4740 DATA 31,3,7,31,127,1,1,1
4760 DATA 248,192,224,248,254,128,128,128
4780 DATA 1,2,4,8,16,32,63,32
4800 DATA 128,64,32,16,8,4,252,4
4820 DATA 32,32,35,34,34,34,34,62
4840 DATA 4,4,196,68,68,68,68,124
4860 DATA 0,1,3,5,5,9,9,17
4880 DATA 0,0,0,128,128,64,64,32
4900 DATA 17,33,63,1,63,16,8,15
4920 DATA 32,240,0,0,252,8,16,240
4940 DATA 1,1,2,2,2,2,2,2
4960 DATA 128,128,64,64,64,64,64,64
4980 DATA 2,2,2,6,10,18,18,34
5000 DATA 64,64,64,96,80,72,72,68
5020 DATA 0,3,3,1,1,1,7,1
5040 DATA 0,128,128,0,0,0,192,0
5060 DATA 1,1,1,33,97,17,9,7
5080 DATA 0,0,0,8,12,16,32,192
5100 DATA 0,0,0,0,16,32,64,255
5120 DATA 0,0,0,0,0,7,8,255
5140 DATA 255,64,32,16,0,0,0,0
5160 DATA 255,8,7,0,0,0,0,0
5180 DATA 0,60,66,129,128,128,128,128
5200 DATA 0,60,66,129,1,1,1,1
5220 DATA 64,64,32,16,8,4,2,1
5240 DATA 2,2,4,8,16,32,64,128
5260 DATA 1,2,4,8,16,32,64,128
5280 DATA 128,64,32,16,8,4,2,1
5300 DATA 128,64,32,16,8,4,2,1
5320 DATA 1,2,4,8,16,32,64,128
5340 DATA 255,128,128,128,128,128,128,128
```

continued on page 44

ODD MAN REFORMS *continued from page 42*

```
5360 DATA 255,1,1,1,1,1,1,1
5380 DATA 128,128,128,128,128,128,128,
255
5400 DATA 1,1,1,1,1,1,1,255
5420 DATA 15,16,32,64,128,128,128,128
5440 DATA 240,8,4,2,1,1,1,1
5460 DATA 128,128,128,128,64,32,16,15
5480 DATA 1,1,1,1,2,4,8,240
5500 DATA 0,0,0,0,0,0,0,0
5520 DATA 1,3,5,9,17,33,65,129
5540 DATA 1,2,4,8,16,32,64,255
5560 DATA 1,1,1,1,1,1,1,255
5580 DATA 3,4,8,8,8,16,16,16
5600 DATA 192,32,16,16,16,8,8,8
5620 DATA 16,16,16,8,8,8,4,3
5640 DATA 8,8,8,16,16,16,32,192
5660 DATA 0,0,0,7,8,16,32,64
5680 DATA 0,0,0,224,16,8,4,2
5700 DATA 64,32,16,8,7,0,0,0
5720 DATA 2,4,8,16,224,0,0,0
5740 DATA 15,8,8,8,8,8,8,8
5760 DATA 240,16,16,16,16,16,16,16
5780 DATA 8,8,8,8,8,8,8,15
5800 DATA 16,16,16,16,16,16,16,240
5820 DATA 1,1,1,1,1,1,1,255
5840 DATA 128,128,128,128,128,128,128,
255
5860 DATA 255,1,1,1,1,1,1,1
5880 DATA 255,128,128,128,128,128,128,
128
5900 DATA 63,32,32,32,32,32,32,63
5920 DATA 252,0,0,0,0,0,0,252
5940 DATA 32,32,32,32,32,32,32,63
5960 DATA 0,0,0,0,0,0,0,252
5980 DATA 0,0,255,129,129,129,129,129
6000 DATA 0,0,255,1,1,1,1,1
6020 DATA 129,129,129,129,129,129,0,0
6040 DATA 1,1,1,1,1,1,0,0
6060 DATA 0,0,129,129,129,129,129,129
6080 DATA 0,0,1,1,1,1,1,1
6100 DATA 129,129,129,129,129,255,0,0
6120 DATA 1,1,1,1,1,255,0,0
6140 DATA 63,0,0,0,0,0,0,63
6160 DATA 252,4,4,4,4,4,4,252
6180 DATA 0,0,0,0,0,0,0,63
6200 DATA 4,4,4,4,4,4,4,252
6220 DATA 63,32,32,32,32,32,32,32
6240 DATA 252,0,0,0,0,0,0,0
6260 DATA 32,32,32,32,32,32,32,63
6280 DATA 0,0,0,0,0,0,0,252
6300 DATA 0,0,255,128,128,128,128,128
6320 DATA 0,0,255,1,1,1,1,1
6340 DATA 128,128,128,128,128,128,0,0
6360 DATA 1,1,1,1,1,1,0,0
6380 DATA 0,0,128,128,128,128,128,128
6400 DATA 0,0,1,1,1,1,1,1
6420 DATA 128,128,128,128,128,255,0,0
6440 DATA 1,1,1,1,1,255,0,0
6460 DATA 255,0,0,0,0,0,0,0
6480 DATA 252,4,4,4,4,4,4,4
6500 DATA 0,0,0,0,0,0,0,255
6520 DATA 4,4,4,4,4,4,4,252
6540 DATA 18,22,32,36,40,44,48,52
```

TYPO TABLE

Variable checksum = 1141427

Line num range			Code	Length
5	-	120	NC	442
140	-	360	BW	508
380	-	640	MZ	456
660	-	1620	IF	488
1700	-	1900	VD	508
4440	-	4780	UE	355
4800	-	5020	IP	319
5040	-	5260	FO	310
5280	-	5500	ZD	331
5520	-	5740	KN	295
5760	-	5980	ZE	341
6000	-	6220	MC	309
6240	-	6460	VM	318
6480	-	6540	IE	98

FIRST, THE GOOD NEWS.



First Star Has 4 New Games.

Fernando Herrera, the designer of *ASTRO CHASE* (1984 Science Fiction / Fantasy Computer Game of the Year*) and our design team again define "State of the Art."

Superior graphics, real-time animations™, multiple screens, intermissions, arcade-quality sound, innovative gaming, challenge and excitement—we deliver it all!

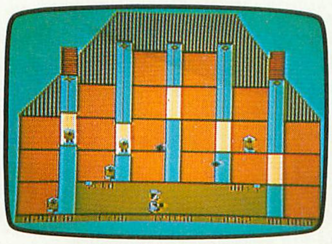
THE BAD NEWS? You can't play them all at once.



BOING!™

Designed by Alex Leavens & Shirley A. Russell

ATARI Atari VCS 2600



BRISTLES™

Starring Peter the Painter

Designed by Fernando Herrera

ATARI Atari Home Computers

Commodore by Paul Kanevsky

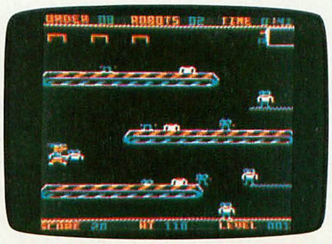


FLIP and FLOP™

Designed by Jim Nangano

ATARI Atari Home Computers

Commodore by Adam Bellin



PANIC BUTTON™

TRS-80 Color Computer by Paul Kanevsky

Commodore Computers

*Electronic Games Magazine 1984 Game Of The Year Award

FIRST STAR SOFTWARE INC

"When being first counts...we're number one!"

22 East 41st Street, New York, NY 10017

Distributor and Dealer Inquiries Invited/212 532-4666

NOVIN™ ANNOUNCES

ANTICA-4™



Now you can take complete advantage of the mode 4 color character graphics capabilities of your Atari 48K 800 or 1200XL disc-based computer! This system provides total control over character generation and graphics mixing, with such features as:

- AUTOMATIC CHARACTER FILE: ANTICA-4 lets you design character graphics without having to set up or catalogue your character-file, knows when you need a new character or simply an edit, and makes characters keyboard assignable.
- AUTOMATIC MULTI-CHARACTER MATTING: This feature lets you perfectly matte moving characters over a moving background, for full character and graphics mixing.
- MULTI-CHARACTER PICTURE ANIMATOR: Name your moving pictures, put them in motion, and watch your creations automatically matte themselves over a full color animated background. Your animations edit easily and automatically.
- MACRO-MICRO CONTROL: The field can be any shape and several times larger than the screen. Work your field with character resolution in the Macro mode, or build your characters with an enlarged view in the Micro mode.
- FINE-LINE DRAWING: Make fine-line drawings over complex backgrounds in any of your colors while ANTICA-4 continuously and automatically updates your character file.
- INTER-MODAL CONSISTENCY: Regardless of the character source, ANTICA-4 lets you easily switch between the editor, animation and building modes without loss of system integrity.
- PLUS: Full function matting editor.
- PLUS: Five speed fine-scrolling field.
- PLUS: Full color and luminosity control, with proportional dimming.
- PLUS: DOS compatibility.
- AND MUCH MORE: Multi-character field-fill, automatic field or cursor-wipe replacement of characters or backgrounds, combined characters, the list goes on and on. You have an incredibly creative system at your command. It's simply a treat to watch it work!

NOVIN is proud to offer this fantastic package for $49.95. ANTICA-4 arrives with a full character set and file of animated pictures. Ask for it at your computer store or order direct from us toll-free.

PO Box 22889
Seattle, Washington 98122

NOVIN™

1-206-323-8270
Outside Washington call toll-free
1-800-422-5525

Visa and Mastercharge accepted. Atari® is a registered trademark of Atari, Inc.

HOLIDAY GREETINGS

by NINA FRANCO

At the holiday season simple things are often the best — handmade gifts, home-cooked food, personal greetings. This program fits the theme. Its charming simplicity makes it just right to please a special friend or family member.

You could call it a computerized Christmas card. It displays a colorful design and plays a seasonal tune in four-part harmony. Then it displays your own message in the display window.

It is short and simple. Even a novice can follow the easy logic, and I've included REM statements to explain all the parts. I hope you all enjoy it.

```
0 REM ANTIC MAGAZINE
1 REM VIDEO CHRISTMAS CARD PROGRAM BY.
...NINA R. FRANCO  2/3/83
1000 GRAPHICS 2:REM LINES 1000,2000 MA
KE THE TREE,TO GET THIS SYMBOL"◣"HIT R
EVERSE CTRL J
1010 COLOR 0:SETCOLOR 0,12,6
1020 POSITION 10,0:? #6;"*":POSITION 9
,1:? #6;"◣WE":POSITION 8,2:? #6;"WISH*
":POSITION 7,3:? #6;"◣YOU*A◣"
1030 POSITION 6,4:? #6;"MERRY◣CHR":POS
ITION 5,5:? #6;"◣ISTMAS*WE◣"
1040 POSITION 4,6:? #6;"*WISH◣YOU◣A*◣"
1050 POSITION 3,7:? #6;"MERRY*CHRISTMA
S":POSITION 2,8:? #6;"◣AND*A◣HAPPY*NEW
◣"
1060 POSITION 8,9:? #6;"YEAR"
2000 POKE 752,1:REM THIS TURNS OFF CUR
SOR
3000 FOR CYCLE=1 TO 51:REM 3000,4000 S
ETS UP SOUND
3010 READ J:READ K:READ L:READ M:SOUND
 0,J,10,10:SOUND 1,K,10,5:SOUND 2,L,10
,5:SOUND 3,M,10,5
3020 IF J=744 THEN SOUND 0,J,0,0:IF K=
744 THEN SOUND 1,K,0,0:IF L=744 THEN S
OUND 2,L,0,0
3030 IF M=744 THEN SOUND 3,M,0,0
4000 FOR Q=1 TO 91:NEXT Q:NEXT CYCLE
4010 ? "FROM NINA AND ALBERTO, CHRISTM
AS,1983":REM PRINT YOUR PERSONAL MESSA
GE HERE
4020 POSITION 10,0:? #6;" ":FOR B=1 TO
 70:NEXT B:POSITION 10,0:? #6;"*":FOR
C=1 TO 70:NEXT C
4030 GOTO 4020:REM 4020,4030 MAKES STA
R FLASH
4099 REM LINES 5000,5070 ARE YOUR NOTE
 VALUES
5000 DATA 91,136,108,91,91,136,108,91,
68,136,108,91,68,136,108,91,68,136,108
,91,60,136,108,91,68,136,108,91
5010 DATA 72,136,108,91,81,204,162,136
,81,204,162,136,81,204,162,136,81,204,
162,136,81,204,162,136
5020 DATA 81,204,162,136,60,121,96,81,
60,121,96,81,60,121,96,81,53,121,96,81
,60,121,96,81
5030 DATA 68,121,96,81,72,182,144,121,
72,182,144,121,91,182,144,121,91,182,1
44,121,91,182,144,121,91,182,144,121
5040 DATA 53,108,85,72,53,108,85,72,53
,108,85,72,50,108,85,72,53,108,85,72,6
0,108,85,72,68,162,136,108
5050 DATA 68,162,136,108,81,162,136,10
8,81,162,136,108,91,136,108,91,91,136,
108,91,81,204,162,136,81,204,162,136
5060 DATA 60,121,102,81,60,121,102,81,
72,182,144,121,72,182,144,121,68,136,1
08,91,68,136,108,91,68,136,108,91
5070 DATA 68,136,108,91,68,136,108,91,
68,136,108,91,744,744,744,744
```

TYPO TABLE

Variable checksum = 104589

Line num range	Code	Length
0 – 1050	TV	588
1060 – 4010	UC	541
4020 – 5030	TU	591
5040 – 5070	ZL	374

AUTORUN.SYS
Build your own in BASIC

by CHUCK HOSICK

When you power-up your computer, it automatically goes through an initialization process called "coldstart". This involves step-by-step, byte-by-byte checking and setting of various statuses and values in the central processor and other chips used by the ATARI 400/800 system. Is there a cartridge in the slot? How much RAM is available? Is a cassette recorder attached? Is a disk drive attached and turned on? These questions (and more) are asked and answered and default values such as screen margins are set. Memory pointers are established and data about attached devices (the device handlers) are stored away in RAM for future reference. This initialization process is commonly known as "booting up" your computer.

If a disk drive is attached when you power up, the Disk Operating System (DOS) will be booted into the computer's memory from drive number one. If you have a binary file on your disk named AUTORUN.SYS, DOS *automatically* loads this file into RAM (and executes it if appropriate) at this time. With an AUTORUN.SYS file on your disk you can power up your computer and automatically run a disk-resident program . . . without typing LOAD or RUN.

There are basically two different types of AUTORUN.SYS files used in the Atari programming community. One is found on the DOS Version 2.0S Master Diskette II supplied by Atari (CX8104). It boots the RS-232 device handler from the 850 Interface Module and then returns control to the Operating System. The second type of AUTORUN.SYS program executes immediate mode BASIC commands such as RUN "D:MENU". In an AUTORUN.SYS file this command would cause a program named "MENU" to be automatically LOADed from the disk and RUN. The first type boots the interface while the second type executes BASIC commands.

Well, what if your BASIC program also needs to use the RS-232 interface? Too bad — only one AUTORUN.SYS file will be loaded from your diskette! You *could* boot the RS-232 interface handler, then load the program manually. But that takes extra effort. So the logical solution is to create an AUTORUN.SYS file that does both!

The BOOTBILD program listed below creates an AUTORUN.SYS file which boots the interface and also executes whatever BASIC commands you enter.

BOOTBILD Program Explanation

Statement 10 is a quick way to save typing time during program development. When you want to SAVE what you have typed, simply LIST line 10, position the cursor over the 1 and type 6 spaces and a return. The program will be SAVEd with line 10 intact (thanks to Atari's screen editor).

Lines 600 through 720 display a message prompting you to turn on the 850 Interface Module and to enter the BASIC command(s) that you desire to be executed on booting up the system.

Line 40 is the INPUT statement for your BASIC command(s). You may separate your BASIC commands with a colon, but you cannot exceed the length of a BASIC logical line (about three physical screen lines).

Lines 50 through 130 contain a checksum routine. Since it is easy to make errors when entering machine language programs in the form of DATA statements, this routine READs the data and computes a checksum for each DATA statement. The last entry in each DATA statement is the checksum which must be equal to the computed sum. If the values are not equal, the program will automatically list the offending line so that it may be corrected. Once you have the program "up and running", this routine and the checksum data may be eliminated from the program to save execution time and memory.

Lines 140 through 370 write the AUTORUN.SYS binary file onto your disk with the desired BASIC command(s) embedded in the file.

Lines 150 through 180 set up a two-byte hex FF binary header and the starting address (hex 3800, decimal 56*256).

Lines 190 through 205 compute and write the ending address by adding the length of your BASIC command(s) to the length of the machine language program.

Chuck Hosick is an electronics engineer involved with microcomputers for more than ten years. His pet project is modification of the 810 Disk Drive to double density.

continued on next page

Lines 210 through 280 write the machine language program and the BASIC statement.

Lines 290 through 370 write the initialization address with the two-byte hex FF header.

Lines 400 through 540 contain the machine language program which performs the booting and BASIC command execution.

The assembled machine language program which is reduced to DATA statements in BOOTBILD is presented below. Instead of using line numbers, it is oftentimes more instructive to discuss machine language programs in terms of memory locations. Thus the following program explanation refers to hexadecimal memory locations, not to line numbers!

AUTBUILD Program Explanation

Locations 3800 to 3836 attempt to OPEN the "R:" handler file. If the OPEN is unsuccessful for any reason (the interface module is not turned on or not attached), the program jumps to the BASIC loader section.

Locations 3837 through 3849 load the "R:" handler from the interface module into memory. If the load is successful — and it should always be if the interface module is alive and well — the next section is executed. If the load is not successful, then the next section is skipped.

Locations 384A through 3856 set up an indirect jump to Subroutine (JSR) — the 6502 microprocessor does not have one of its own. Locations OC & OD hold the DOS initialization vector, DOSINI. By loading from OC & OD and storing the contents in 3855 and 3856, an indirect JSR is "manufactured". This JSR through DOSINI then initializes DOS and returns to the next section.

Locations 3857 through 38D6 are the BASIC command executor. Execution of the BASIC command(s) is performed by "stealing" the screen editor handler vector table and substituting our own. The table substituted is identical to the original except for the GET character vector. The GET character vector now points to location 3876. The substitute vector table is stored at locations 3867 through 3875.

The GET character routine (locations 3876 through 3884) writes the BASIC command onto the screen in the immediate read mode. This command will be executed as soon as control is returned to the operating system. Locations 3885 through 3891 set up values for a RETURN to the operating system and then RETURNs. This RETURN causes the BASIC command to be executed and away we go!

A useful modification to this program would be to warn the user if the interface was not booted successfully or to print a reminder and then attempt the boot again — but that will be left as an exercise for the more serious student.

Type in the BOOTBILD program (and SAVE it to disk!), RUN it. Enter your desired BASIC command(s) and you now have an AUTORUN.SYS file on your disk which boots the interface and then executes your BASIC command(s).

Requires 16K and disk

```
10 REM BOOTBUILD by Chuck Hosick for
ANTIC MAGAZINE
20 DIM A$(50),DD(146)
30 GOTO 600
40 INPUT A$
50 OPEN #1,8,0,"D:AUTORUN.SYS"
60 PUT #1,255
70 PUT #1,255
80 PUT #1,0
90 PUT #1,56
100 L=146+LEN(A$)-1
110 PUT #1,L
120 PUT #1,56
130 FOR I=1 TO 146 STEP 10:CHKSUM=0
140 IF I+10>146 THEN FOR J=1 TO 147-I:
GOTO 160
150 FOR J=1 TO 10
160 READ D:CHKSUM=CHKSUM+D:DD(I+J-1)=D
:NEXT J
170 READ D:IF CHKSUM=D THEN NEXT I:GOT
O 210
180 ? "}":? :? "CHECK SUM ERROR AT LIN
E NO. ";PEEK(184)*256+PEEK(183):CLOSE
#1
190 XIO 33,#1,0,0,"D:AUTORUN.SYS"
200 LIST PEEK(184)*256+PEEK(183):END
210 FOR I=1 TO 146
220 D=DD(I)
230 IF I=99 THEN PUT #1,LEN(A$):GOTO 2
50
240 PUT #1,D
250 NEXT I
260 FOR I=LEN(A$) TO 1 STEP -1
270 PUT #1,ASC(A$(I,I))
280 NEXT I
290 PUT #1,255
300 PUT #1,255
310 PUT #1,226
320 PUT #1,2
330 PUT #1,227
340 PUT #1,2
350 PUT #1,0
360 PUT #1,56
370 CLOSE #1
380 END
400 DATA 169,80,141,0,3,169,1,141,1,3,
708
410 DATA 169,63,141,2,3,169,64,141,3,3
,758
420 DATA 169,5,141,5,3,141,6,3,169,0,6
42
430 DATA 141,4,3,141,9,3,141,10,3,141,
596
440 DATA 11,3,169,12,141,8,3,32,89,228
,696
450 DATA 16,3,76,87,56,162,11,189,0,5,
605
460 DATA 157,0,3,202,16,247,32,89,228,
48,1022
470 DATA 16,32,6,5,165,12,141,85,56,16
5,683
480 DATA 13,141,86,56,32,0,0,169,103,1
41,741
490 DATA 33,3,169,56,141,34,3,169,0,14
1,749
500 DATA 214,56,96,251,243,51,246,118,
56,163,1494
```

```
510 DATA 246,51,246,60,246,76,228,243,
0,172,1568
520 DATA 214,56,240,9,185,145,56,206,2
14,56,1381
530 DATA 160,1,96,140,33,3,169,228,141
,34,1005
540 DATA 3,169,155,160,1,96,584
600 ? "⊠":? :? "BOOTBILD by Chuck Hosi
ck, A.C.A.O.C.":? :? "This program cre
ates an AUTORUN.SYS"
610 ? "program on disc which:":? "  1.
 Loads the RS-232 handler from"
620 ? "       the 850 interface module i
f:":? "       a. you have one and":? "
     b. it is turned on"
630 ? "and then":? "   2. executes an i
mmediate mode":? "     BASIC command w
hich you enter."
640 ? "      For example - RUN":CHR$(34
):"D:MENU":? :? "     ENTER YOUR BASIC
 COMMAND":?
650 GOTO 40
660 END
```

TYPO TABLE

Variable checksum = 116666

Line num range	Code	Length
10 – 120	UV	298
130 – 240	FB	456
250 – 360	NJ	243
370 – 490	GB	412
500 – 630	CA	565
640 – 660	GX	109

```
0100 ; LIST#D:AUTBUILD
0110 ;
0120 ; ROUTINE TO BOOT IN THE RS232 IN
TERFACE
0130 ; THEN EXECUTE A BASIC STATEMENT
0140 ; E.G. RUN"D:MENU
0150 ;
0160 DUMMY     =  $0000
0170 SIO       =  $E459
0180 SCRNRD    =  $F3E4
0190 DOSINI    =  $0C
0200           *= $3800
0210           LDA #$50
0220           STA $0300          SET UP D
CB TO
0230           LDA #1             INPUT "R
" HANDLER
0240           STA $0301          FROM 850
 INTERFACE
0250           LDA #$3F
0260           STA $0302
0270           LDA #$40
0280           STA $0303
0290           LDA #5
0300           STA $0305
0310           STA $0306
0320           LDA #0
0330           STA $0304
0340           STA $0309
0350           STA $030A
0360           STA $030B
0370           LDA #$0C
0380           STA $0308
0390           JSR SIO            TO INPUT
 "R" HANDLER
0400 ;
0410           BPL IO.OK
0420           JMP LDBSC          IF CAN'T
 INPUT
0430 ;
0440 IO.OK     LDX #$0B           SET UP I
NPUT BUFFER
0450 LOOP      LDA $0500,X
0460           STA $0300,X
0470           DEX
0480           BPL LOOP
0490           JSR SIO            TO BOOT
IN "R"
0500 ;
0510           BMI LDBSC          IF BOOT
FAILED
0520 ;
0530           JSR $0506          TO INIT.
 RS232
0535 ;
0540           LDA DOSINI         CREATE I
ND. JSR
0550           STA INDJSR+1
0560           LDA DOSINI+1
0570           STA INDJSR+2
0580 INDJSR    JSR DUMMY
0590 ;
0600 LDBSC     LDA #SCRVEC        SET UP A
DDRESS
0610           STA $0321          TO "STEA
L" SCREEN EDITOR
0620           LDA #$38           VECTOR T
ABLE
0630           STA $0322
0640 ;
0650           LDA #$0            DUMMY VA
RIABLE FOR
0660           STA CMDLEN         LENGTH O
F BASIC COMMAND
0665 ;
0670           RTS                RETURN T
O DOS
0680 ;
0690 SCRVEC    =  *-$3800
0700           .DBYTE  $FBF3      COPY OF
SCREEN EDITOR
0710           .DBYTE  $33F6      VECTOR T
ABLE, EXCEPT
0720           .WORD   SCRNWT WITH NEW
 SCREEN WRITE
0730           .DBYTE  $A3F6
0740           .DBYTE  $33F6
```

continued on next page

```
0750          .DBYTE   $3CF6
0760          JMP SCRNRD
0770 ;
0780 SCRNWT   =   *
0790          .BYTE    $0
0800          LDY CMDLEN       NEW SCRE
EN WRITE ROUTINE
0810          BEQ ENDBAS
0820          LDA BASCMD-1,Y   WRITES T
HE STORED BASIC
0830          DEC CMDLEN       COMMAND
TO THE SCREEN
0840          LDY #1
0850          RTS
0860 ;
0870 ENDBAS   STY $0321        SETS UP
VALUES FOR
0880          LDA #$E4         NORMAL R
ETuRN
0890          STA $0322
0900          LDA #$9B
0910          LDY #1
0920          RTS
0930 ;
0940 BASCMD   =   *             STORA
GE RESERVED FOR
0950          *=  *+$44         BASIC
COMMAND
0960 CMDLEN   =   *             LENGT
H OF BASIC COMMAND
0970          .END
```

Flight Simulator II

For Atari computers with 48K memory



Put yourself in the pilot's seat of a Piper 181 Cherokee Archer for an awe-inspiring flight over realistic scenery from New York to Los Angeles. High speed color-filled 3D graphics will give you a beautiful panoramic view as you practice takeoffs, landings, and aerobatics. Complete documentation will get you airborne quickly even if you've never flown before. When you think you're ready, you can play the World War I Ace aerial battle game. Flight Simulator II features include ■ animated color 3D graphics ■ day, dusk, and night flying modes ■ over 80 airports in four scenery areas: New York, Chicago, Los Angeles, Seattle, with additional scenery areas available ■ user-variable weather, from clear blue skies to grey cloudy conditions ■ complete flight instrumentation ■ VOR, ILS, ADF, and DME radio equipped ■ navigation facilities and course plotting ■ World War I Ace aerial battle game ■ complete information manual and flight handbook.

See your dealer . . .

or write or call for more information. For direct orders please add $1.50 for shipping and specify UPS or first class mail delivery. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800/637-4983

subLOGIC Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995

MORE INTERRUPTING

Deeper into display lists.

by ALLAN MOOSE and MARIAN LORENZ



The display list interrupt (DLI) feature of ATARI computers allows you to run brief machine-language program routines during your television's horizontal blank period. The ATARI uses 192 horizontal scans of the electron beam for the playfield each 1/60th of a second. The horizontal blank is the period during which the beam is turned off while returning to the left side of the screen to begin the next line.

The computer is much faster than the television, and during the blank period it can use the time to vary colors, modify Player/Missile graphics, or alter the character set graphics. Use of the display list interrupt provides a wide range of opportunity for creative programmers.

In our previous article (ANTIC, June 1983), we demonstrated short machine-language routines that changed up to three colors in the display. The examples that we used employed a single DLI instruction inserted into a display list. But there is no reason why you must be restricted to a single interrupt in a display list since it is possible for each mode line in a display list to contain an interrupt instruction. In this article we explain how to implement several display list interrupts in the same program. First we will focus on making color changes.

Allan Moose is an associate professor (math/physics) at Southampton College, New York. Marian Lorenz is a special education teacher for handicapped children in Central Islip, New York.

Later we will mention other ways to use DLIs.

A major problem in the use of multiple DLIs is that there is only one memory location in which to store the starting address of a DLI service routine. When ANTIC encounters a DLI it signals the central processor unit (CPU) to halt its current operations and proceed to a subroutine. The CPU then automatically checks memory locations 512 and 513 to find the lo-byte and hi-byte of the address of the DLI service routine to execute.

Suppose you have two different service routines for the CPU to perform. You might store each routine at a different location in Page Six, but to your dismay there is provision for storing only one starting address.

Of course, there are ways to solve this predicament. The solution you choose will depend upon the specific operations you wish to perform. If your DLI routine will do the same job each time it is executed, but uses different values (for example it changes a single color register several times) then a table and pointer can be used. This is called a "table-driven" DLI service routine. With this method you set up a table of color values in memory and provide a pointer (a particular memory location) that tells the service routine which color in the table to use.

If, on the other hand, each of your DLI routines is going to perform quite different tasks, then the most efficient plan is to make each service routine put the starting address for the next routine into memory locations 512 and 513, thus pre-loading the pointer.

COLOR TABLE

Program 1 demonstrates the use of a color table.

```
90 72,169, 82,141,',141,10,212,141,7 08,169,16,141,00,02,104,64208,169,1
100 72,138,72,169,,169,40,162,48,141,10,212,141,23,208512,513,654286,513,
110 142,24,208,1698,169,33,141,0,212,162,140,142,26,208,104,170,104,64512
120 72,138,72,169,,169,40,162,48,141,10,212,141,23,208,54286,19214,4,4,9
130 142,24,208,1698,169,33,141,0,212,162,140,142,26,208,104,170,104,64
140 72,138,72,152,,152,72,169,132,162, 84,160,04,141,10,21272,169, 82,141
150 141,26,208,142},142,22,208,140,01,212,169,00,141,00,02,10,212,141,22,
```

MORE INTERRUPTING *continued from page 54*

This program uses six display list interrupts to change a yellow rectangle into a rectangle with six colors. The program is divided into four sections:

1. Lines 10 through 50 set up the color table and initialize the pointer.
2. Lines 70 through 100 put six interrupt instructions into the Graphics 7 display list.
3. Lines 120 through 170 create the display.
4. Lines 190 through 230 set up and enable the display list interrupt routine.

The portions of the program that are of most interest to us are the color table, the pointer, and the service routine. These have been placed into Page Six as follows.

Address	Contents
1536 (00 = LO BYTE, 06 = HI BYTE) THROUGH 1566 (30 = LO BYTE, 06 = HI BYTE)	31 Bytes of Machine Language DLI Service Routine
1567 (31 = LO BYTE, 06 = HI BYTE)	THE POINTER
1568 (32 = LO BYTE, 06 = HI BYTE) THROUGH 1573 (37 = LO BYTE, 06 = HI BYTE)	6 Bytes of the COLOR TABLE

STEP 1.

MNEMONIC	DECIMAL VALUE	FUNCTION
PHA	72	Push accumulator to stack.
TXA	138	Transfer X-register to accumulator
PHA	72	Push accumulator to stack.
INC POINTER	238,31,6	Increment (add one to value in pointer).

This last instruction is carried out each time the interrupt is used. We initialized the value here to 31 so that when the first DLI is encountered this instruction will increment the pointer to 32, which is the lo-byte of the first color's address.

STEP 2.

LDX POINTER	174,31,6	Load X-register with the value in pointer.
LDA ADDR,X	189,0,6	Load accumulator with the value in address following using the X-register as an index.

When this command is executed, the "0" in 0,6 is added to the value in the X-register to get the lo-byte of the address.

STEP 3.

STA WSYNC	141,10,212	Wait for horizontal blank
STA COLREG	141,22,208	Store color into color register.
CPX NUM	224,37	compare the value in X-register with 37.

This command subtracts 37 from the value in the X-register. The result is used by the next command:

BNE END	208,5	Branch if not equal to zero

If the result of the CPX command is not equal to zero, the program jumps ahead to restore the X-register and the accumulator and return from the interrupt, by-passing the next two instructions:

STEP 4.

LDA RESET	169,31	Load the accumulator with 31.
STA POINTER	141,31,6	Store the accumulator value into 31,6 to reset the pointer.

These last two commands are executed only when the result of the comparison, CPX, is zero. This occurs when the X-register holds the lo-byte of the last color's address.

STEP 5.

The remaining commands restore the registers and exit the routine:

END PLA	104	Pull value from stack to accumulator
TAX	170	Transfer accumulator to x-register.
PLA	104	Restore accumulator.
RTI	64	Return from interrupt.

PROGRAM DESCRIPTION

Each time a DLI is encountered the accumulator and X-register values are saved to the stack. The pointer is incremented and the new value is placed into the X-register. The accumulator is then loaded with a color value at an address, the lo-byte of which is the value in the X-register. After this color value has been stored in a color register, the program tests to see if the address used was that of the last color value. If not, the routine ends for that interrupt. If it is the last color, then the pointer is reset before the routine ends.

Most of the assembly-language commands in this program

continued on next page

should be familiar to you from our previous article. However, there are some new wrinkles here. Notice that we have used LDA twice. But we used a different decimal code in each case. The decimal code specifies both the operation and the type of addressing mode used. When the decimal code for LDA is 169, the number immediately following is loaded into the accumulator. This is called the immediate mode of addressing. When the decimal code for LDA is 189, the accumulator will use the next two numbers as the address of the byte to be loaded, but only after the contents of the X-register have been added to the lo-byte. The X and Y registers are also known as the X-index register and the Y-index register, so this mode of addressing is called indexed addressing. A third mode of addressing is illustrated by the LDX instruction. If the decimal value of LDX is 174, the two numbers following LDX are the low and high bytes of the address of the value to be loaded into the X-register. This is known as the absolute mode of addressing. Now you can see that 224 is the decimal value for the immediate mode of the CPX instruction since it is comparing the next number, 37, with the value in the X-register.

The INC instruction (decimal value 238) uses absolute addressing since the next two numbers are the address of the number to be incremented. The last new instruction in this program, BNE (branch on result not zero), uses relative addressing. While a program is being run by the CPU, a special register called the *program counter* holds the address of the next instruction to be executed. When a BNE is acted upon, the program counter is incremented by one and the number following the BNE is added, giving the address of the next instruction. If you look at our program again, you will see that the sixth number after the line BNE END 208,5 is PLA 104 which is the start of the routine to exit the program.

NEXT TRICK

Our second method of implementing multiple interrupts, in which each routine sets the starting address of the following routine, is more flexible than the simple use of a color table. You are not limited to changing a single register, but can change different registers at different places in the display. However, to keep the program that illustrates this technique simple, we have chosen to make two changes in the text color of Graphics 2. We have done this by using two DLI routines. This first changes the text to pink, the second changes it to blue.

Study the listing of Program 2 and note that line 40 puts an interrupt instruction at the third and sixth mode lines; line 60 is the data for the first interrupt routine; line 70 is the data for the second. The data for these routines is stored on Page Six. With a little counting you can see that the first interrupt routine is stored at 1536 (00,06) through 1551 (15,06) and the second at 1552 (16,06) through 1568 (32,06). The basic structure of these two routines is the same. Here is the first one written out in detail:

```
PHA ................ 72 ... push value in accumulator
                            to stack
LDA COLVAL ..... 169,92 ... load accumulator with 92
                            (pink)
STA WSYNC .. 141,10,212 ... wait for horizontal blank
STA COLREG.. 141,22,208 ... store value in accumulator
                            in the hardware register
LDA LOADDR .... 169,16 ... load accumulator with lo-
                            byte of the address of the
                            next routine
STA PAGE2..... 141,00,02 ... store value in accumulator
                            at 512.
PLA ............... 104 ... load accumulator with
                            value on the stack.
RTI ................ 64 ... return from interrupt.
```

The second routine differs from the first only in the color value used and the fact that it stores the address of the first service routine back into 512.

FANCY INTERRUPTS

We have included Program 3 for you to take apart and to improve. We suggest that you write out the assembly-language mnemonics for the two service routines. The first routine is at line 90. The second is at lines 100 through 120. After you run the program and write out the service routines you will realize that we have inverted three of the redefined characters by putting a four into the hardware register 01,212. This is just one of the many things you can do with a DLI. When you run Program 3 you will see the character set being redefined in the printing in the text window. This is one part of the program that you can improve. With DLIs you can use one set of characters in the display part of the screen and a different set in the text window by putting the starting address of the character set you wish to use in CHARBAS—54281.

The power of DLIs comes from the fact that you can change the nature of the screen display at any mode line on the screen. With Player/Missile graphics you can change player colors, width, and priority. If you consider a player to be a vertical column eight bits wide by 128 bytes high you can use DLIs to divide this strip into sections and position each section at different places horizontally on the screen.

A final idea for experimentation might be to have a DLI at each mode line of the display list and use the service routine to play music while the display is being drawn.

```
1 REM *** PROGRAM 1 ***
5 REM *** SET UP COLOR TABLE ***
10 FOR CT=0 TO 5
20 READ D:POKE 1568+CT,D
30 NEXT CT
40 DATA 200,90,56,152,88,120
50 POKE 1536+31,31:REM INITIALIZE COUN
TERS
60 REM *** PUT SIX INTERRUPTS INTO TH
E DISPLAY LIST ***
70 GRAPHICS 7:COLOR 1
80 DL=PEEK(560)+PEEK(561)*256
90 FOR C=18 TO 48 STEP 6
100 POKE DL+C,141:NEXT C
110 REM *** CREATE DISPLAY ***
120 POKE 752,1:? "DLI COLOR TABLE EXAM
PLE"
130 PLOT 112,49
140 DRAWTO 112,14:DRAWTO 48,14
```

```
150 POSITION 48,49
160 POKE 765,1
170 XIO 18,#6,0,0,"S:"
180 REM *** SET UP DLI SERVICE ROUTIN
E ***
190 FOR J=0 TO 30:READ B:POKE 1536+J,B
:NEXT J
200 DATA 72,138,72,238,31,6,174,31,6,1
89,0,6,141,10,212
210 DATA 141,22,208,224,37,208,5,169,3
1,141,31,6,104,170,104,64
220 POKE 512,0:POKE 513,6
230 POKE 54286,192
```

TYPO TABLE

Variable checksum = 83559

Line num range	Code	Length
1 - 100	RE	349
110 - 220	NI	458
230 - 230	GW	21

```
10 REM *** PROGRAM 2 ***
20 GRAPHICS 2+16
30 DL=PEEK(560)+PEEK(561)*256
40 POKE DL+7,135:POKE DL+10,135
50 FOR J=0 TO 31:READ B:POKE 1536+J,B:
NEXT J
60 DATA 72,169,92,141,10,212,141,22,20
8,169,16,141,00,02,104,64
70 DATA 72,169,136,141,10,212,141,22,2
08,169,00,141,00,02,104,64
80 POKE 512,0:POKE 513,6:REM SET ADDRE
SS OF FIRST ROUTINE
90 POKE 54286,192:REM ENABLE DLI
100 FOR J=0 TO 8
110 POSITION 4,J:? #6;"ANTIC"
120 NEXT J
130 GOTO 130
```

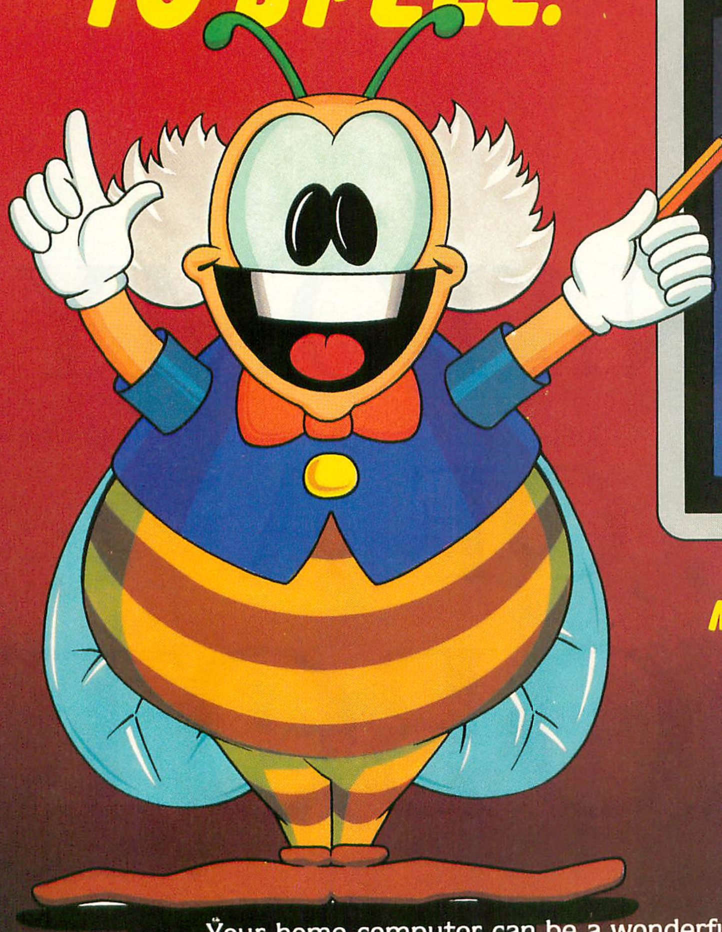
```
1 REM PROGRAM 3
10 REM ** SET UP DLI ROUTINES **
20 GRAPHICS 2:POKE 752,1:POKE 712,138
30 POKE 708,60
40 ? "PLEASE WAIT, LIFTING ANCHOR.."
50 DL=PEEK(560)+PEEK(561)*256
60 POKE DL+10,135:POKE DL+11,135
70 REM ** READ IN DLI ROUTINE **
80 FOR J=0 TO 49:READ B:POKE 1536+J,B:
NEXT J
90 DATA 72,169, 82,141,10,212,141,22,2
08,169,16,141,00,02,104,64
100 DATA 72,138,72,152,72,169,132,162,
 84,160,04,141,10,212
110 DATA 141,26,208,142,22,208,140,01,
212,169,00,141,00,02
120 DATA 104,168,104,170,104,64
130 GOSUB 230
135 REM ** ENABLE INTERRUPTS PRINT DIS
PLAY **
140 POKE 512,0:POKE 513,6
150 POKE 54286,192
160 ? CHR$(125)
170 POSITION 9,4:? #6;"@A"
180 POSITION 9,5:? #6;"BC"
190 POSITION 8,6:? #6;"DEF"
200 POSITION 8,7:? #6;"DEF"
210 GOTO 210
220 REM *** REDEFINE CHARACTER SET **
230 POKE 106,PEEK(106)-8
240 START=(PEEK(106))*256
250 POKE 756,START/256:POKE 752,1
260 FOR R=0 TO 1023
270 POKE START+R,PEEK(57344+R):NEXT R
280 FOR X=0 TO 55
290 READ D:POKE START+32*8+X,D:NEXT X
300 DATA 0,0,1,1,3,7,7,15
310 DATA 192,248,224,128,128,192,192,2
24
320 DATA 15,31,63,63,127,255,1,1
330 DATA 224,240,248,248,252,128,128,1
28
340 DATA 0,1,255,255,255,127,95,95
350 DATA 255,255,255,255,255,255,255,2
55
360 DATA 240,240,255,254,252,248,240,2
24
370 RETURN
```

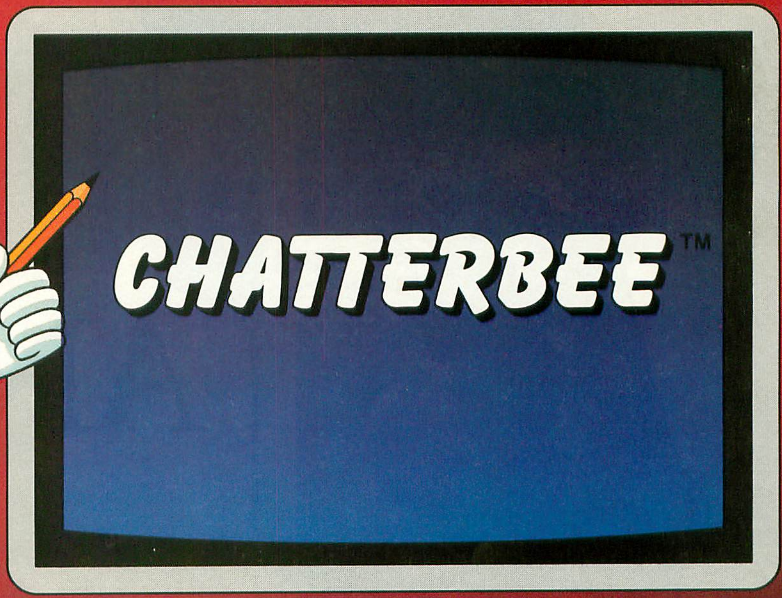
TYPO TABLE

Variable checksum = 102804

Line num range	Code	Length
1 - 110	JU	482
120 - 220	AR	358
230 - 340	CF	364
350 - 370	VH	80

LISTEN! IT'S THE VOICE OF YOUR COMPUTER... TEACHING YOUR FAMILY TO SPELL.





MEET CHATTERBEE, FROM DON'T ASK:

- A challenging game
- Talks on your Atari computer
- Colorful graphics and music
- Teaches spelling at all levels from age 6 to adult

Your home computer can be a wonderful teacher — with the right software. Software that taps the computer's power to challenge, to correct, to encourage, to entertain . . . and to SPEAK. CHATTERBEE is the right software for teaching youngsters and adults to spell.

THE GAME:

- automatically puts player at appropriate level of difficulty in response to player's performance.
- teaches correct spelling when player cannot spell the word.
- retests player on missed words in later rounds.
- rewards good spelling with high score, advancement to higher level.
- makes learning fun.

THE WORDS:

- 2500 spelling words at 25 levels of difficulty covering grades 1-12 and college-level.
- selected in accordance with current educational standards.
- each word spoken aloud and used in a spoken sentence.

THE VOICE:

- specialized version of the Software Automatic Mouth (S.A.M.) by Don't Ask built into CHATTERBEE.
- talks on any Atari Computer, without any separate speech synthesizer.
- CHATTERBEE's voice has no effect on the video display.

Hear Chatterbee today, wherever software is sold. To order direct from TRONIX, send a check or money order, or call to order C.O.D. Add $2.00 for shipping and handling. California residents add 6% sales tax (6-1/2% if you reside in L.A. County).

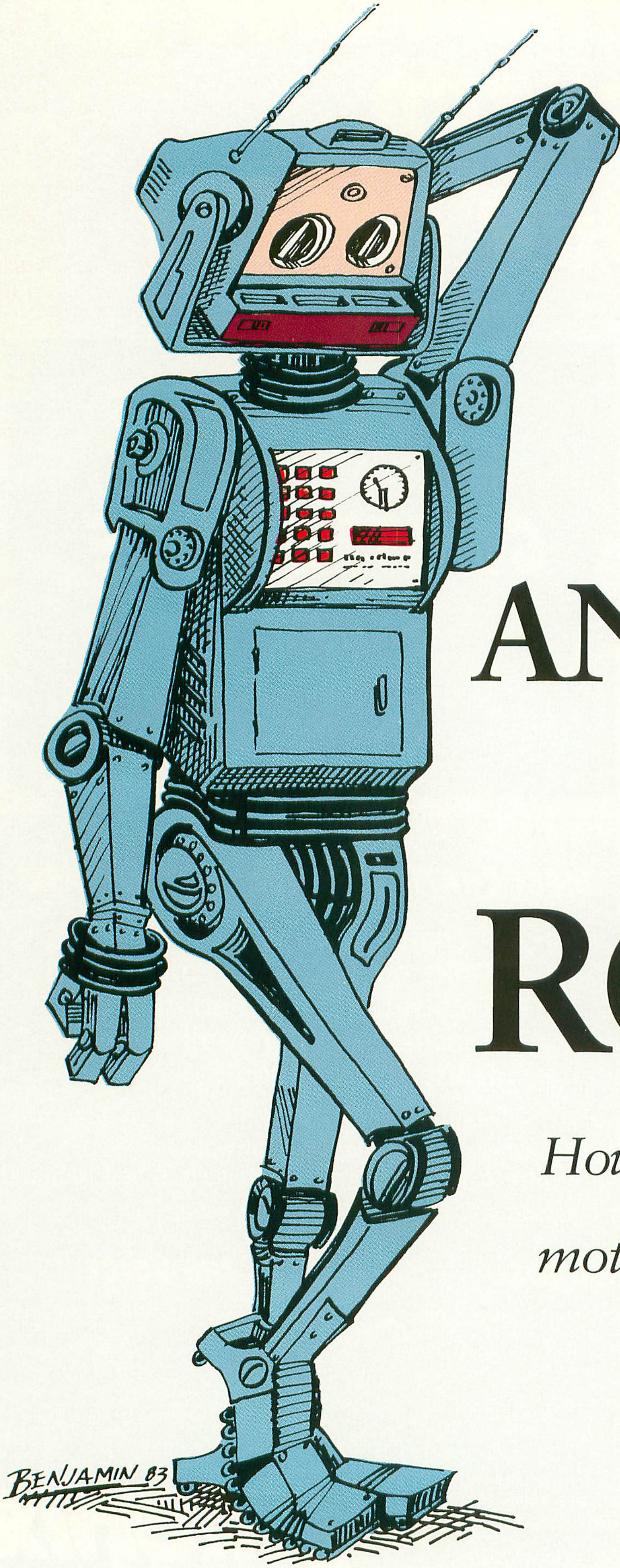
For Atari computers (40K RAM) and Commodore 64.

Suggested retail price: $39.95

Dealer inquiries welcome.

TRONIX™

8295 South La Cienega Blvd., Inglewood, CA 90301
(213) 215-0529



ANATOMY OF A ROBOT

How to create controlled motion with your ATARI

by EVAN ROSEN

Currently available robots that attach to personal computers range in price from about $1000 to $3000, and are usually committed to a single configuration. This series of articles will develop and explore a novel approach to creating controlled motion from a microcomputer, with the following rules in mind. A hobby robotics development system should:

- Be very low in cost
- Be expandable in small steps to larger sizes
- Allow the creation of many different robots from a single set of parts
- Have both strength and fine motion capabilities
- Permit simple interfacing with any computer
- Be composed of standard parts available at hobby, toy, and/or electronics stores, or by mail
- Run from any standard programming language
- Have the support of a major computer magazine.

We would like to reduce the cost of building a robot by a factor of 10, while significantly enhancing the flexibility and programmability of the final product.

"ROBOT," AND OTHER HOUSEHOLD WORDS

The term "robot" comes from a Slavic language root with a meaning related to "work." It was first used in *RUR*, a play written in 1921 by the Czech dramatist Karel Capek. These days, any repetitive motion machine with the least bit of reprogrammability is likely to be called a robot, at least by its manufacturer. And laboratories around the world contain complicated mechanisms that can walk, talk, and slide on their bellies like so many reptiles. The term "robotic system" is often used for such advanced assemblies, and we'll use it too from time to time.

Robots are generally made up of elements that correspond to various parts of the bodies of land animals. There are other possible ways to build robots, but on the other hand animals, and particularly animals with hands, appear to have undergone upwards of 10 million years of field testing, and their extremely functional designs should not be quickly dismissed.

Speaking loosely, an animal's body is composed of bones, muscles, a circulatory system, a nervous system, an hormonal system, and several other systems that don't directly bear on our project. The robotic equivalents of bones are sometimes called "rigid members" or "rigid elements," but "bones" will be good enough for us. And although "end-effector" is a professional-sounding bit of robo-speak, we'll simply use "hand" if that's what a particular end-effector resembles. As for our robots' muscle-equivalents, we'll call them "muscles," unless we refer to them by their specific names, such as "motors," "servos," (see below) and so on.

Furthermore, although an animal's circulatory system has many functions, the only one we want to imitate is its capability to supply power to the muscles. Hence, our robots' circulatory system equivalents will be called the "power bus." The form of the power bus depends on the designer's choice of muscles, and can consist of anything from electrical wires to cables to hydraulic plumbing, as well as many other combinations of gadgetry.

As for the nervous system, we'll replace the anatomical terms "sensory neuron" and "afferent nervous system" with the terms "sensors" and "sensor bus." Likewise, "central nervous system" (brain and spinal cord) becomes "computer" and the anatomical terms "motor neurons" and "efferent nervous system" will be replaced by "control bus."

Finally, animals' hormonal systems can be loosely related to moods. In our robots, this is a function of software. Moody robots? We'll see.

MAKING ROBOTS MOVE

For my money, the best way to obtain inexpensive, simple, and flexible computer control of motion is to use the magical little boxes called "servos." These are well known to any hobbyist who has used radio-control mechanisms.

SERVOS

A servo generally consists of a DC motor, a gear train, a feedback potentiometer, and an electronic assembly that converts a sequence of logic-level pulses into the current that drives the motor. The pulses can be conveyed to the servo by a radio link from their source, or can be sent to the servo over a wire.

These capabilities are stuffed into a small box with three protruding wires. The wires are: ground (usually black), 5-volt input (usually red), and pulse input (usually yellow). All you need to produce controlled motion from your computer is a 5-volt electrical source (approximate voltage and simple regulation are okay, as are batteries), a store-bought servo, a connector for a joyport on your ATARI, some wire, and a program. That's it! Now, let's talk about some details.

WHAT SERVOS "WANT"

Servos are analog devices. In order to know what to do, they need to see a variable-width pulse every so often. They are generally limited to either 180 or 270 degrees of rotational motion. This is usually enough to get by on, and when it isn't you can improvise. The pulse width that is sent to the servo carries positional information in a simple format; for any given servo there is a range of pulses it can use.

Let's say that our servo "wants" to see pulses from 1 msec to 2 msec in length. ("Msec" means "millisecond," or 0.001 second, which is about 1000 ATARI clock cycles.) If we send this servo a 1.5 msec pulse, this tells the servo to seek the center-point of its rotational range. A 1 msec pulse tells the servo to seek one extreme of its range, while a 2 msec pulse causes it to seek the other extreme. The pulses have to come to the servo with some regularity, because it only moves slightly in the direction you send it after each pulse. Then it waits patiently for another pulse. Sending no pulses means "Relax, Servo." What could be simpler? Now, about these pulses . . .

MORE JOY FROM A JOYPORT

For the most part, you've probably been using the joyports on your ATARI as input devices, in combination with a joystick or paddle. However, the joyports can also send out logic signals. Some of you may have seen the various joyport-printer interfaces that are available.

continued on next page

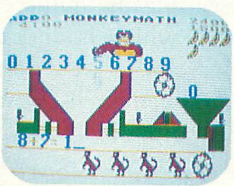
Evan Rosen is the co-author of ValFORTH™ from Valpar International.



TO HELP EDUCATE YOUR CHILD, WE ASSEMBLED THIS DISTINGUISHED FACULTY.

It's a rare teacher who can make a child think learning's fun.

But we've found several of them. And they make Monkeymath™ more fun than your child ever dreamed an educational game could be.



Monkeymath
by Dennis Zander

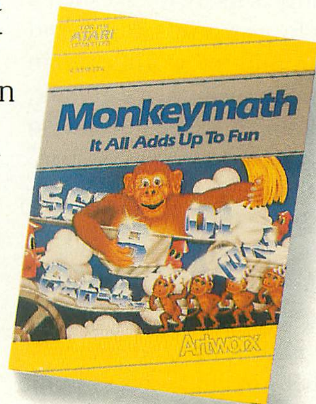
Of course Monkeymath helps give your child a better understanding of addition, subtraction, multiplication and division. That's the part *you'll* like.

But the part your *child* will like is Monkeymath's arcade-type action and animation, three skill levels and scoring. So, like any good arcade game, kids just can't stop playing it.

In fact, in a recent issue of Antic magazine, David Plotkin called Monkeymath "... one of the most entrancing educational games ever written." (And Monkeynews™ and Monkeybuilder,™ our soon to be released reading comprehension and word recognition games will be every bit as entrancing.)

So Monkeymath does more than help your child understand math—it teaches him that learning can be fun.

And, as you can see, you don't find teachers like that just anywhere.



Monkeymath,™ *Monkeynews,*™ and *Monkeybuilder*™—a new educational series from Artworx® For the Commodore 64, Atari, Apple and VIC-20 computers. Cassette/Diskette from $23.95. Artworx Software Co., Inc., 150 North Main St., Fairport, N.Y. 14450. For a free catalog of Artworx Software write or call 800-828-6573.

Artworx®

So you can play.

Apple, Atari, Commodore 64 and VIC-20 are registered trademarks.

ANATOMY OF A ROBOT
continued from page 63

These allow printing without the 850 interface.

Behind the four joyports on the 400/800s is a single chip called PIA (parallel interface adapter). This chip is a 6520 or equivalent, and if you are a spark-hound you can get the spec sheets and find out exactly what it does. We'll provide some of the details below, along with a few lines of cookbook code.

Each joyport contains nine pins. As we look at the joyport, pin 1 is in the upper left corner, pin 5 at the upper right, 6 at the lower left, and 9 at the lower right.

```
1    2    3    4    5
*    *    *    *    •
   •    •    G    •
   6    7    8    9
```

Pins 1 through 4 are memory-mapped to bits through which you can send output or receive input. Pin 8 is ground. (For the curious, pins 1–4 are usually joystick inputs forward/back/left/right, pins 5 and 9 are paddle inputs, pin 6 is the trigger and pin 7 carries 5 volts at a few milliamps.) On the 400/800s the joyports are mapped to memory through locations 54016, called "PORTA" by Atari, which maps to joyports 1 and 2, and 54017, called "PORTB," which is linked to joyports 3 and 4. We'll illustrate the procedure for outputting from pins 1 through 4 of Port 1. The other joyport pins can be controlled in a similar manner. (Remember that "reset," when applied to a bit, means "make the bit 0," while "set" means "make the bit 1.")

To output from Port 1, we must first "program" its bits for output. At power up, all joystick ports are programmed for input so as to accept joystick signals. We can program Port 1 by first resetting bit 2 (counting from 0) of 54108 to put PORTA into "program mode." Atari calls address 54018 "port A control," or "PACTL." (54019 is PBCTL.) Since bit 2 of PACTL is set on power up, it can be reset by PEEKing PACTL, saving the result for use in a moment, and poking this result (minus four) back into PACTL. We can now program Port 1 for output by setting the low four bits of PORTA. (Port 2 is the high four bits.) We do this by storing 15 into PORTA. Finally, we set bit 2 in PACTL to get PORTA out of program mode and back into input/output mode. To do this, we simply POKE the original value of PACTL back into it.

In BASIC the above procedure might be handled as follows:

```
100 X=PEEK(54018)
110 POKE 54018,X-4
120 POKE 54016,15
130 POKE 54018,X
```

While in Forth it might be handled this way:

```
54016 CONSTANT PORTA
54018 CONSTANT PACTL
PACTL C@ DUP 4 - PACTL C!
15 PORTA C! PACTL C!
```

Running either listing will program pins 1 through 4 of Port 1 for output. In other words, the low four bits of anything POKEd into PORTA (54016) will show up on pins 1 through 4 of Port 1. The upper four bits will be ignored. If you have a high-impedance voltmeter and a steady hand, you can verify this by checking the logic levels on the pins as you do some POKEs.

HEARTBEATS AND PULSES

Now we can send signals to a servo. The next question is, how do we create a pulse of, say, precisely 1.5 msec?

BASIC executes in the 1–2 msec range, and is too slow to create pulses with width-accuracies in the 10 microsecond (µsec) range, which is what we need for small movements in our servos. Forth executes in the 50–150 µsec range, which again is too slow. What we need is some machine code from a USR routine in BASIC or a CODE definition in Forth. The routine should take a number from 0 to 255 and put out a pulse of from 1 to 2 msec.

However, we don't want to have to constantly remember to send pulses to the robot. We would rather have a joint simply move to a certain position and then stay there. In other words, we want the appropriate pulses to be sent out automatically and continuously by a background task. This would probably be best driven on the ATARI by the 60/second vertical blank interrupt. (Slow, periodic interrupts of this kind are sometimes called "heart-beat" interrupts.)

WHAT DOES THIS MEAN IN PLAIN ENGLISH?

At this point, an advanced hacker could put all the pieces together and create motion. The novice will have to wait until next month, when we'll make and control our first "joint" step-by-step using BASIC, Forth and about $22 in parts.

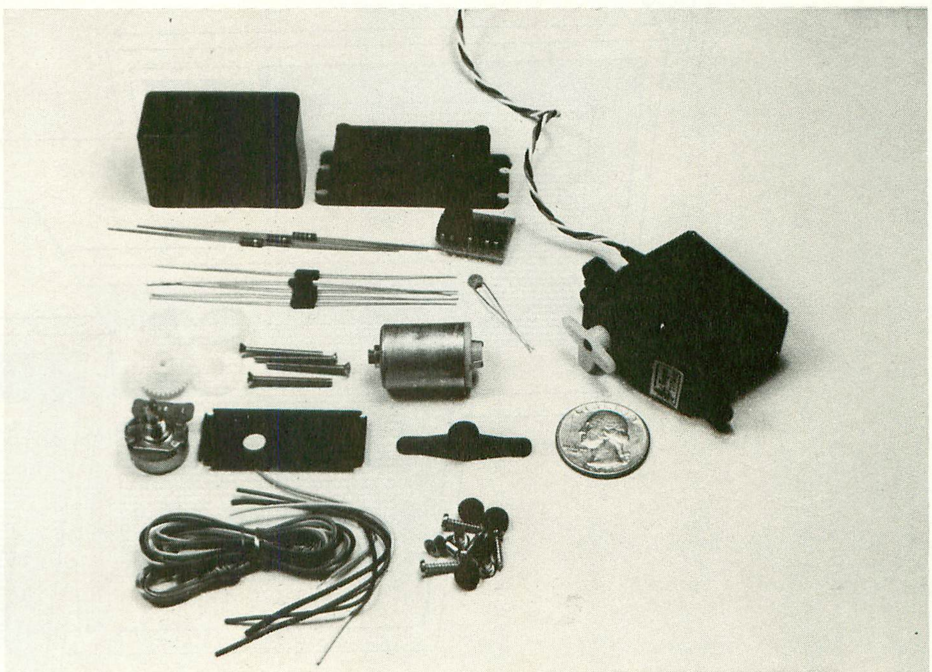
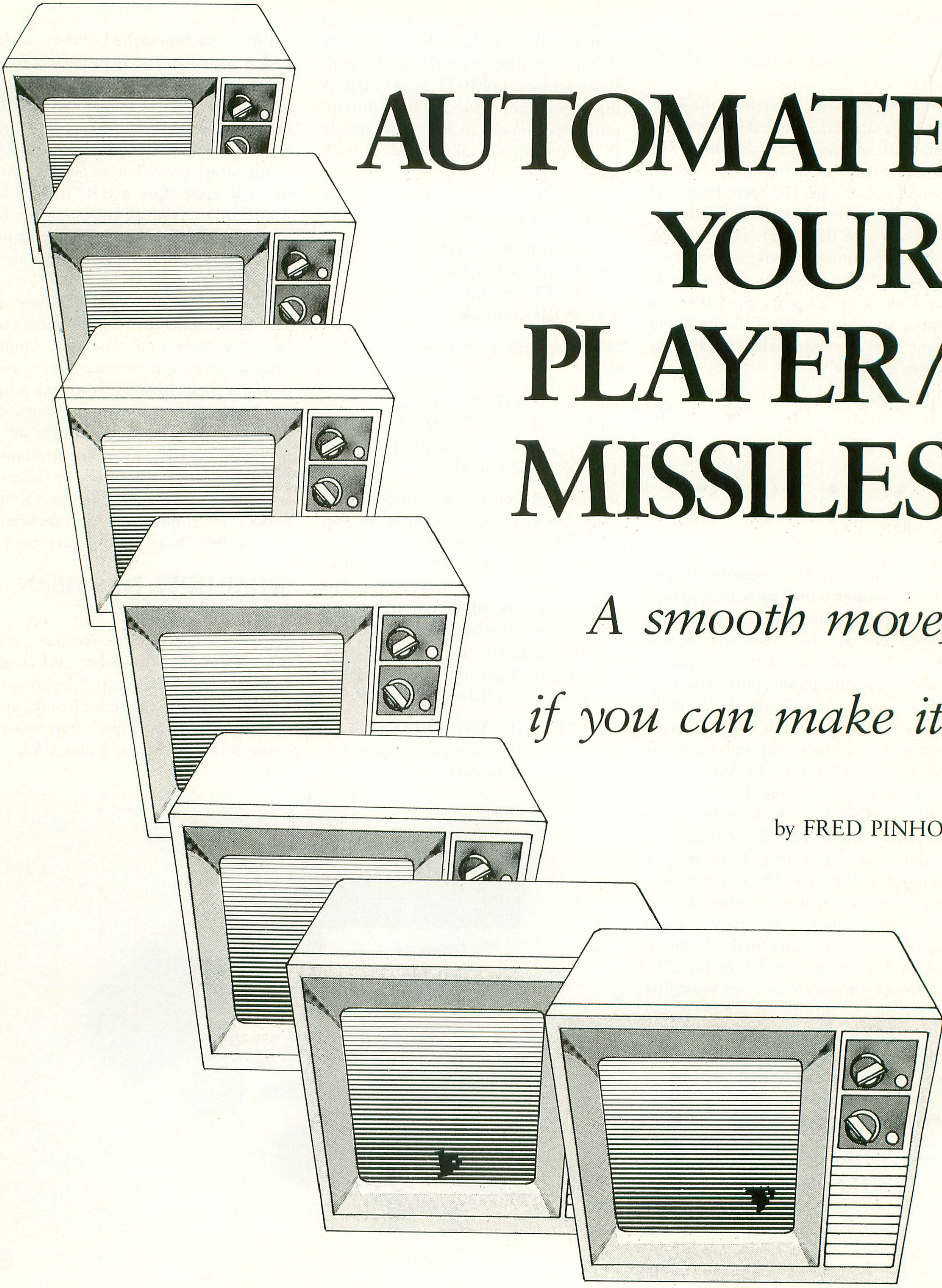


Figure 1: An unassembled servo kit and an assembled servo (right).



AUTOMATE YOUR PLAYER/ MISSILES

A smooth move, if you can make it.

by FRED PINHO

You are no doubt aware of the graphics power inherent in the Atari Player/Missile system. It is frustrating, however, to know that its full potential can only be demonstrated via machine language. It is also confusing to have to keep track of all the various registers needed. Locating the P/M data into safe areas is another recurring chore each time you program.

I have always felt that the answer to these problems should be furnished by the computer itself. So, I've written a utility program (Listing 1) that automatically writes a complete subroutine for moving one or two players via machine language. Movement of the players is independent of your BASIC program. No matter how bogged down BASIC becomes, player movement remains smooth. Player zero is controlled by the joystick in Port 1 and player one by Port 2. The utility requires 24K for disk and 16K for cassette.

The utility will create a subroutine that can be merged with your BASIC program. The VBI program can be stored either as a string or in Page Six. The option of string storage is provided to allow you to store your own machine-language routines in Page Six. The VBI routine uses memory locations 1000–1015 (decimal) to store data. These locations are tucked between the printer and cassette buffers and are free. Page Zero locations 203–206 are also used.

How does Player/Missile movement stay independent of the "plodding" BASIC program? The routine is written to be executed during the TV vertical blank period. For those not familiar with this concept, a short description follows.

Every sixtieth of a second, the electron beam of a TV does a complete scan of the screen. It is then turned off and brought back to the top of the screen in preparation for another scan. The time interval during which the electron gun is off, is called vertical blank. During vertical blank, the microprocessor is diverted (via an interrupt) from the main program to perform housekeeping chores. After completing its chores, the microprocessor still has some time available before the electron gun is turned back on. The folks at Atari provided a means for machine-language programmers to tie into the processor during the vertical blank interrupt (VBI). Any graphics changes made during the VBI are made while the screen is blank. Thus, everything changes cleanly. For further information, see pages 8 – 16 through 8–19 in *De Re Atari*.

I tried to write this utility so that it would be complete within itself. The program is self-prompting and you don't have to remember or look up any details each time you use the utility. Although this lengthens the program and increases your typing time, these features will pay for themselves each time you run the program.

The program does have limitations. The primary one is that it has no provision for missiles. Thus, without further effort, you can't simulate your favorite shoot-em-up with this utility. There are, however, numerous games requiring only player movement. In later installments I'll add missile movement and also

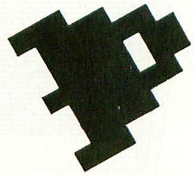


the ability to change the player image based on the direction of movement.

The routine as written is usable for small players only. If you want to devise a screen-high player and move it around, you'll have to write your own code. The program limits player size to a maximum of 10 bytes. This should be sufficient for the majority of applications. The program written by this utility is not the most efficient code due to the need for generality. However, it works and does the job.

After a short introduction the program will ask for general parameters that your host BASIC program will be using. These include the graphics mode, installed RAM in your machine, etc. Then it will proceed to determine the settings of the various registers. Some comments are in order here:

1. You can set limits on the motion of each player independently. For example, you can restrict player zero to the left or top half of the screen and player one to



the other half. With these limits, "never the twain shall meet." Note that you will get horizontal screen "wrap-around" if you choose the extreme limits for horizontal motion. You can also allow the players to go off-screen, while not wrapping around by a choice of suitable limits. This routine does not allow vertical wrap-around.

2. Since setting motion limits incorrectly could foul up the VBI routine, the utility checks and warns you if this has occurred.

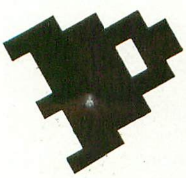
3. The utility takes care of the always confusing fact that players move in memory opposite to the way they move on the screen. To move up on the screen, the player moves down in memory.

4. You obviously must design your player prior to using this utility. The player data is stored, within the program, as strings (P0$,P1$) in the interest of saving memory. This does make it difficult to check and edit your player data. Note that the listed representation of the string on your screen will not be correct if the string contains any keyboard editing codes. To check the data in the string, convert each character to its ATASCII value and print the number. Use a routine such as:

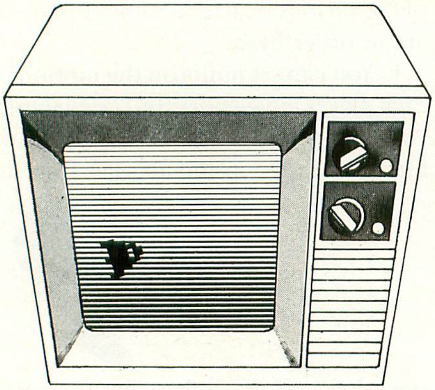
```
L = LEN(String Name):FOR X = 1 TO
L:? ASC(String Name(X,X)); " , " ; :
NEXT X
```

One other problem with string representation of data is that values of 155 (ATASCII for [RETURN] and 34 (quotes) will cause errors in the string. Thus the utility checks for these and inserts a space in the string. It then corrects the string internally by using the CHR$ function to insert the correct code. Everything will then be fine as long as you don't attempt to list the corrected string to the screen via the editor. The

continued on next page



Fred Pinho is a biochemical research engineer and a self-taught programmer interested in BASIC and assembly language. The Atari 800 is his first computer.



utility can handle up to five of each of these problem codes and will warn you if you try too many. If you need more, change lines 20, 650, 980, 1005, 1060 and 1090.

5. The utility writes three other strings to the created subroutine. The first is ZERO$ which is a machine language routine to quickly zero-out your player memory. It was taken from Bob Stewart's article in ANTIC (April, 1983). The large string, PM$, is the VBI player-mover routine. SET$ is used to enable the VBI routine.

6. You can choose to store your player data in either of two ways: beneath the display list or above a lowered RAMTOP. In either case, the utility automatically adjusts for the RAM requirements of the various graphics modes. If you plan to change graphics modes in your program, give the utility the graphics mode with the highest RAM requirement. Otherwise you could foul up your player data. Note that, if you store your player data above RAMTOP, certain BASIC operations can erase your player. These include scrolling a text window or clearing the screen.

7. You will have a choice of two player speeds, "normal" and half-speed. You can't assign different speeds for each player. Whichever speed you choose will be used for both players.

When you have entered all your data, the utility will write your subroutine to disk under the file name "PM.LST." Delete the utility with NEW and LOAD your BASIC program. Note that your BASIC program should not have line numbers in the range of 31000–32000. Now merge your player-movement subroutine into your BASIC program with ENTER "D:PM.LST." Finally, put a line near the start of your BASIC to GOSUB 31000. That's it! Your players will be created and can be moved to your heart's desire. Note that the subroutine establishes the graphics mode for your program. One further caution, be sure your strings and arrays are DIMensioned prior to calling this subroutine. Otherwise, an error message and computer lockup could occur.

You don't have a disk drive? No problem . Simply make the changes below and you will have a cassette-based utility.

Conversion of Program for Cassette

Change line 790 and add line 791 as shown below:

```
790 OPEN #1,8,0,"C:"? #1;"1 DATA
    ";:FOR I=0 to 50:? #1;"0,";:
    NEXT I:? #1;"0";:? #1
791 RMTP=(8+(RAM*8))*4:
    IF PMST THEN 850
```

Note that in line 790, a "dummy" line of DATA is written. This is needed because of a bug in the Operating System. After the cassette handler is OPENed, the cassette motor will not stop running until a record is written to it. Thus the procedure for cassette is a little more tedious than with disk. Run the cassette-based utility and record the subroutine on tape. Erase the utility via NEW. Now ENTER the subroutine into the computer. Delete line 1 and then LIST the subroutine back to the cassette via LIST "C:" Now LOAD your BASIC program and merge the two via the ENTER command.

If you wish to test the subroutine before merging it with your program, do the following:

1) ENTER it into the computer
2) Change line 32000 to:
   32000 GOTO 32000

This transforms the subroutine into a stand-alone program and prevents an error message. Now RUN the program to test your player-movement routine.

The VBI routine will remain in place at all times even if you [BREAK] your program. Pressing [RESET] will disable the routine. If you wish to disable the routine under program control, use the line shown below:

```
POKE 54286,0: POKE 548,62:POKE
549,233:POKE 54286,64
```

This will disable the VBI. However, the Player/Missile system will still be enabled and the images will remain. You can disable the P/M system via BASIC in the standard manner. While debugging a program, do not RUN the program again without using [RESET] first to disable the VBI. Otherwise you could lock up the computer.

The source code for the VBI routine is given in Listing 2. As an aid to understanding the routine, I've also provided

continued on page 73

TAKE-APART

Line Numbers	
31000	Sets graphic mode, reserves areas for PM data and POKEs PMBASE.
31010–31020	Specifies ZERO$ and zeroes PM area.
31030	Sets Player/Missile and color registers.
31040–31070	Stores player data in strings (P0$, P1$) and loads data into PM area. Also corrects strings when data values of 34 (quotes) or 155 (return) occur.
31080–31110	Loads data registers used by the VBI routine. See Listing 3.
31115–31142	The VBI routine stored as PM$. Routine is for half-speed.
31147–31149	Modifications to PM$ to allow normal speed motion.
31150	Loads VBI routine into Page Six.
31155–31160	Defines SET$ and executes routine to enable VBI.
31190	Activates the player-missile system.



Hear at last. Games with

Alien annihilation never sounded so good.

Because we've broken the sound barrier on home computer games. With music. You heard right. Music.

And we're not talking mamby-pamby little bleeps here, pal.



We're talking toe-tapping, finger-snapping, Top-40 stuff. Scored just for our newest releases. And playing throughout.

Which ought to keep a Joystick Jockey like yourself humming right along through each and every blast, bomb and blow-up that threatens your existence.

From strategy games to shoot 'em ups.

Are you ready to face the music?

If Our Music Has You Hearing Things, Wait Till You See This.

Incredible, arcade-quality graphics.

And they're so great—how great are they? They're so great you'll want to play them again and again. And then you'll tell your friends about them. And they'll want to play. And then your family will find out and they'll all want to play. And then that fat kid down the block will want to play. And all your sister's friends. And their boyfriends. And . . . better keep our newest releases a secret. Or get Dad to pop for another Atari.

The First Games Ever, That Tell You What The Heck Is Going On, Right At The Start.

It's just like a movie.

Except, instead of filling both hands with buttery popcorn, you've got your hand on the Joystick, tensed up for what's to come.

And while you wait, poised, ready, eager, you'll find out, through the terrific screen titles, the objective of the game, the characters and the scenario.

You'll find out what planet you're on.

What the fuss is all about.

Why you're involved.

And perhaps of singular importance to you, how to keep from being obliterated.



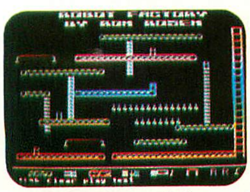
real music for your Atari.*



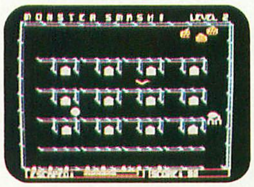
Our star. Our Numero Uno. The Tail of Beta Lyrae.™ Changes as you play. Will drive you out of your mind with unexpected switcheroonies. No one's ever mastered it. But you sure can try...



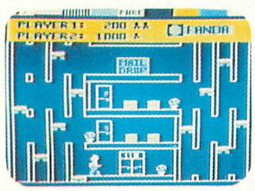
And then there's Cosmic Tunnels.™ Four games in one. Meaning four times the challenge. Four times the chance you might just get blown away. The graphics are sure to blow your mind!



Mr. Robot and His Robot Factory.™ Looking for a factory job? Here's an opening. Help Mr. Robot thwart the aliens. Screens scream with color, action and sound! Plus, a graphics kit to design your own game screens!



Monster Smash™ is the gravest game to ever hit the cemetery. And it's filled with a deathly strategy. What do you have to do? Mash the monsters! Let the visitors live.



Cohen's Tower™ gets you used to life in the Big City fast. Starting you off in a skyscraper. But the boss is really watching. So work fast. You might just get a raise... if you can handle the action.

Get ready to bring your Atari the most playable, the most graphically involving new games it's ever screened. Or heard.

It's the most out of our minds.

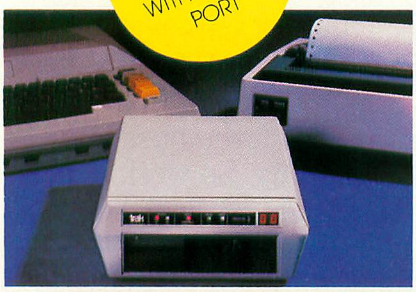
And together, with your Atari, we make beautiful music.

DATAMOST

The most out of our minds.™



AVAILABLE NOW! WITH PRINTER PORT





TRAK'S floppy and hard disk drive systems for the Apple and IBM-PC are available at many Computerland and other fine stores worldwide.

. . .WITH IT'S FLEET OF THE MOST ADVANCED SINGLE AND DOUBLE DENSITY DRIVE SYSTEMS IN THE UNIVERSE - TOTALLY COMPATIBLE WITH ATARI* COMPUTER MODELS 400, 800, 600XL, 1200XL, 1400XL, AND 1450XL.

DOCK YOUR FAVORITE PRINTER DIRECTLY TO OUR DRIVE'S BUILT-IN PARALLEL PRINTER INTERFACE. THERE'S NO NEED TO BUY AN EXPENSIVE ATARI 850 MODULE.

THE COMMAND CONTROL PANEL FEATURES READ, WRITE AND DENSITY INDICATORS, A TRACK COUNTER TO LOCATE EVERY BIT OF YOUR DATA AND A TOUCH-SENSITIVE SWITCH TO PROTECT IT.

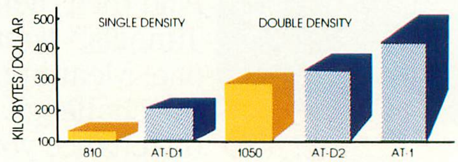
WARP SPEED OF UP TO 18 TIMES FASTER THAN **ANY** OTHER ATARI DRIVE IS ACHIEVED WITH OUR OPTIONAL TURBO-CHARGED SOFTWARE.

AWESOME POWER — DESTROY A PLANET OR LEARN HOW ONE IS CREATED. BALANCE YOUR CHECKBOOK OR WRITE A BESTSELLER. LEARN A NEW LANGUAGE OR CREATE ONE.

IT'S MAGNIFICENTLY SIMPLE! — JUST PLUG IT IN AND LIFT-OFF!

*Atari is a registered trademark of Atari, Inc.

TRAK GIVES YOU THE MOST STORAGE FOR YOUR DOLLAR!



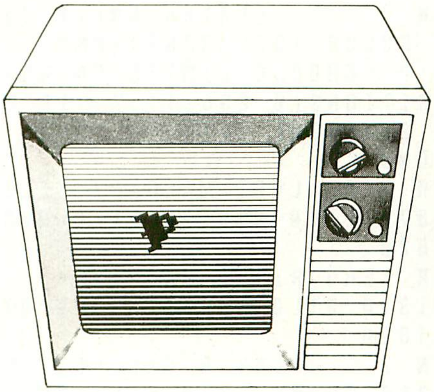
OUR FLAGSHIP, AT-D2, WITH TWICE THE STORAGE CAPACITY OF THE ATARI 810 DRIVE PLUS A PRINTER INTERFACE AND COMMAND CONTROL PANEL, HAS A VALUE OF OVER $1000 YET COSTS LESS THAN $500!

SEE YOUR DEALER NOW FOR A TEST FLIGHT, OR

call toll free: **1-800-323-4853**
in Illinois, call collect: 1-312-968-1716
TWX 910-222-1848

trak™ A commitment to quality

microcomputer corporation 1511 Ogden Ave., Downers Grove, IL 60515



continued from page 68

Table 1. This table gives the assembly and BASIC labels for each fixed memory location used by the VBI routine. It also gives the function of each location. If you wish to change some variables in the created subroutine, without rerunning the utility, this table is for you. It will enable you to determine which POKE statement to change.

From my experience, the main problem in typing this utility will be entering the machine-language routines contained in PM$, SET$ and ZERO$. Any other error in the program will generate an error message which can be used to find the problem. However, making any error in any of these strings will, with high probability, cause the computer to go "bye-bye." The resultant lockup will force you to turn the computer off and on again to regain control. There will be no error message to help you locate the problem.

So, SAVE your program periodically as you type it in, and run TYPO on it till you get it right. Make sure you have a backup for any program with which you intend to use the routine produced by this program, because that's where any hidden problem is most likely to cause lockup.

If you've gotten this far, the toughest part is over. Find and correct any other errors in your typing and then simply RUN the utility. It is self-prompting and will guide you throughout. Prior to running the utility, you should have drawn your players and converted each byte into its corresponding decimal equivalent.

The Take-Apart on page 68 gives a line-by-line analysis of the subroutine that you will create with the main program. You can use this to customize the subroutine to your specific needs.

Table 1

Memory Locations Used by VBI Routine

Memory Location	Label Used in Assembly Code	BASIC Variable Used to Set Location	Used for
1000	VPSP0	STV0	Vertical positions of
1001	VPSP1	STV1	players zero and one
1002	STPL0L	PL0L	Start of player
1003	STPL1L	PL1L	memory area. Low
1004	STPL0H	PL0H	(L) and High (H)
1005	STPL1H	PL1H	bytes
1006	UPL0	UPL0	Upper limits of
1007	UPL1	UPL1	player motion
1008	LL0	LL0	Lower limits of
1009	LL1	LL1	player motion
1010	LFL0	LFL0	Left limits of
1011	LFL1	LFL1	player motion
1012	HPOST0	HZST0	Horizontal position
1013	HPOST1	HZST1	players zero and one
1014	RTL0	RTL0	Right limits of
1015	RTL1	RTL1	player motion
203	PB1	PB	Number of bytes in
204	PB1	PB	player image plus one
205	STPLL	—	Low and high bytes
206	STPLH	—	of start player memory area. Set by routine from locations 1002–1005

NOTES

1. If you wish to change the initial vertical position or limits in your subroutine, you can change the values POKEd into registers 1000–1001 and 1006–1009. Since the screen motion is opposite to the movement of data in memory, use the formula below to calculate the value to POKE.

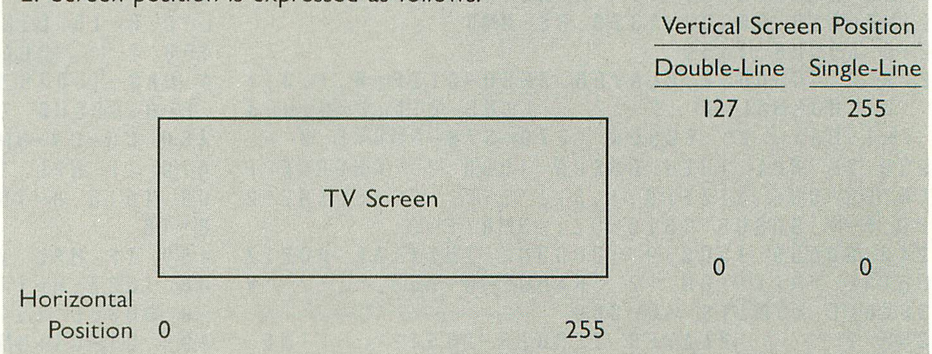
Double Line Resolution

Value to POKE=(Screen Vertical Position–127)*(–1)

Single Line Resolution

Value to POKE=(Screen Vertical Position–255)*(–1)

2. Screen position is expressed as follows:



continued on next page

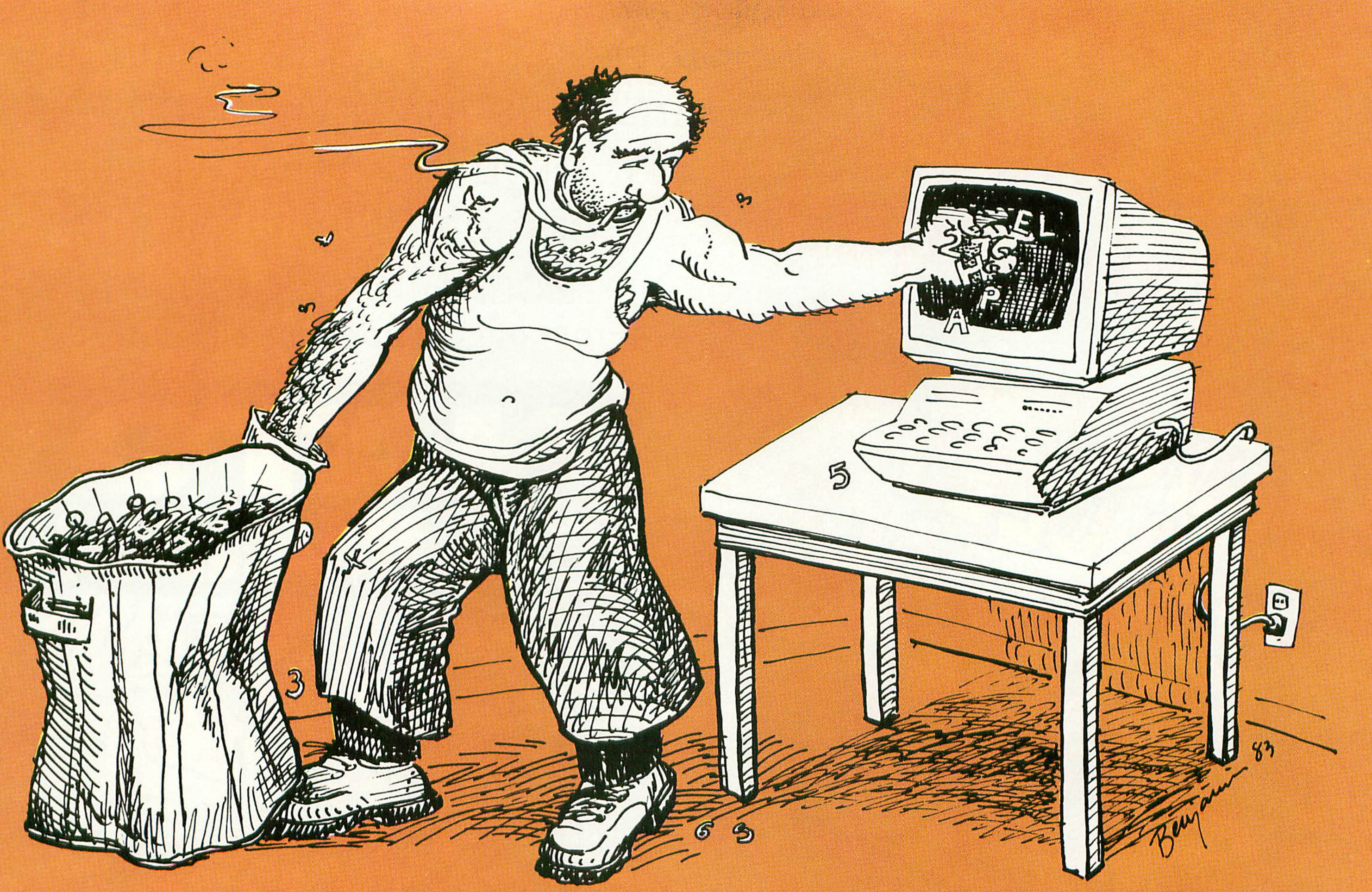
```
10 GRAPHICS 18:POKE 708,36:POKE 709,19
6
20 DIM NMB$(10),NA$(7),Z$(1),QT0(4),RT
N0(4),QT1(4),RTN1(4)
30 FOR X=4 TO 9:READ Y:COLOR Y:PLOT X,
4:NEXT X:FOR X=11 TO 15:READ Y:COLOR Y
:PLOT X,4:NEXT X
40 FOR X=4 TO 8:READ Y:COLOR Y:PLOT X,
9:NEXT X:FOR X=10 TO 14:READ Y:COLOR Y
:PLOT X,9:NEXT X
50 DATA 240,76,97,217,229,82,109,207,2
46,69,114,240,82,101,211,243,115,212,2
25,82,116
60 A=PEEK(711):B=PEEK(708):C=PEEK(709)
:D=PEEK(710):POKE 711,D:POKE 708,A:POK
E 709,B:POKE 710,C
70 FOR X=1 TO 20:IF PEEK(53279)=6 THEN
 POP :GOTO 90
80 NEXT X:GOTO 60
90 POKE 708,40:POKE 709,202:F=0:OPEN #
3,4,0,"K:":GRAPHICS 0
100 ? "WELCOME TO PM MOVER!":? "A SERI
ES OF QUESTIONS":? "WILL BE DISPLAYED.
"
110 ? "EACH QUESTION WILL REQUIRE":? "
A NUMERICAL ANSWER."
120 ? "INDICATE CHOICE BY TYPING DIGIT
S.":? "TYPE RETURN ONLY AFTER NUMBER":
? "IS COMPLETED."
130 ? "YOU CAN ABORT NUMBER AT ANY TIM
E,":? "PRIOR TO RETURN,BY TYPING A SPA
CE."
140 ? :? "PRESS START WHEN READY."
150 POKE 53279,8:IF PEEK(53279)=6 THEN
 ? CHR$(125):GOTO 170
160 GOTO 150
170 GOSUB 1560:? "INDICATE GRAPHICS MO
DE FOR YOUR":? "PROGRAM! ANY MODE EXCE
PT 10.";
175 LINE=170:L=0:H=11:GOSUB 1370:G=NMB
:IF NMB=10 THEN GOSUB 1500:GOTO 170
180 GOSUB 1560:? "INDICATE RAM IN YOUR
 MACHINE.":? "TYPE 1-4":? "   (1)16K":?
 "   (2)24K":? "   (3)32K"
190 ? "   (4)40-48K":? "?";:LINE=180:L=
1:H=4:GOSUB 1370:RAM=NMB
200 GOSUB 1560:? "CHOOSE NUMBER OF PLA
YERS(1 OR 2)!";:LINE=200:L=1:H=2:GOSUB
 1370:NPL=NMB-1
210 GOSUB 1560:? "DO YOU WISH SINGLE(1
) OR DOUBLE(2)":? "LINE RESOLUTION?";:
LINE=210:GOSUB 1370:RS=NMB
215 GOSUB 1560
220 ? "CHOOSE PLAYER ZERO SIZE(0,1,3)!
":? "NORMAL=0":? "?";:LINE=215:L=0:H=3
:F=1:NA$="2":GOSUB 1370:SZ0=NMB:F=0
230 IF NPL THEN GOSUB 1560:? "CHOOSE P
LAYER ONE SIZE(0,1,3)!";:? "?";:LINE=2
30:F=1:GOSUB 1370:SZ1=NMB:F=0
240 GOSUB 1560:? "CHOOSE INITIAL HORIZ
ONTAL POSITION":? "RANGE=0-255.";:? "V
ISIBLE LIMITS=48-200"
250 ? "     PLAYER ZERO(0-255)?";:LINE=
250:L=0:H=255:GOSUB 1370:HZST0=NMB
260 IF NPL THEN ? "     PLAYER ONE(0-25
5)?";:LINE=260:GOSUB 1370:HZST1=NMB
270 GOSUB 1560:? "CHOOSE LIMITS ON HOR
IZONTAL":? "POSITIONS(0-255)!":? "IF C
HOOSE 0 AND/OR 255,WILL GET"
280 ? "WRAPAROUND!"
290 ? "   PLAYER ZERO LEFT MARGIN?";:LI
NE=290:GOSUB 1370:LFL0=NMB:IF LFL0>HZS
T0 THEN GOTO 1620
300 ? "   PLAYER ZERO RIGHT MARGIN?";:L
INE=300:GOSUB 1370:RTL0=NMB:IF RTL0<HZ
ST0 THEN GOTO 1620
310 IF NPL THEN ? "   PLAYER ONE LEFT M
ARGIN?";:LINE=310:GOSUB 1370:LFL1=NMB:
IF LFL1>HZST1 THEN GOTO 1620
320 IF NPL THEN ? "   PLAYER ONE RIGHT
MARGIN?";:LINE=320:GOSUB 1370:RTL1=NMB
:IF RTL1<HZST1 THEN GOTO 1620
330 HV=108+(108*(RS=1)):LV=16+(16*(RS=
1)):L=2:H=125+128*(RS=1):GOSUB 1560
340 ? "INITIAL VERTICAL POSITION":? "R
ANGE=2-";H;".";:? "VISIBLE LIMITS=";LV
;"-";HV;")"
350 ? "   PLAYER ZERO(2-";H;")?";:LINE=
350:GOSUB 1370:GOSUB 1570:STV0=NMB
360 IF NPL THEN ? "   PLAYER ONE(2-";H;
")?";:LINE=360:GOSUB 1370:GOSUB 1570:S
TV1=NMB
370 GOSUB 1560:? "CHOOSE LIMITS ON VER
TICAL":? "POSITIONS(2-";H;")!"
380 ? "   PLAYER ZERO LOWER LIMIT?";:LI
NE=380:GOSUB 1370:GOSUB 1570:LL0=NMB:I
F LL0<STV0 THEN GOTO 1620
390 ? "   PLAYER ZERO UPPER LIMIT?";:LI
NE=390:GOSUB 1370:GOSUB 1570:UPL0=NMB:
IF UPL0>STV0 THEN GOTO 1620
400 IF NPL THEN ? "   PLAYER ONE LOWER
LIMIT?";:LINE=400:GOSUB 1370:GOSUB 157
0:LL1=NMB:IF LL1<STV1 THEN GOTO 1620
410 IF NPL THEN ? "   PLAYER ONE UPPER
LIMIT?";:LINE=410:GOSUB 1370:GOSUB 157
0:UPL1=NMB
415 IF NPL THEN IF UPL1>STV1 THEN GOTO
 1620
420 GOSUB 1560:? "CHOOSE PLAYER COLORS
.":? "HUES ARE ROUGHLY":? "      0     B
LACK TO WHITE"
430 ? "      1-4    REDS":? "      5    PU
RPLE":? "      6-10   BLUES":? "     11-13
 GREENS":? "      14-15 ORANGES"
440 ? :? "   PLAYER ZERO ";:GOSUB 1510:
L=0:H=15:LINE=440:GOSUB 1370:C0=NMB*16
450 ? "   PLAYER ZERO ";:GOSUB 1520:H=1
4:NA$="3579▖▔":F=1:LINE=450:GOSUB 1370
:F=0:GOSUB 1540
460 C0=C0+NMB
470 IF NPL THEN ? "   PLAYER ONE ";:GOS
UB 1510:H=15:LINE=470:GOSUB 1370:C1=NM
B*16
480 IF NPL THEN ? "   PLAYER ONE ";:GOS
UB 1520:H=14:F=1:LINE=480:GOSUB 1370:F
=0:GOSUB 1540
490 C1=C1+NMB
500 GOSUB 1560:? "CHOOSE BACKGROUND CO
```

```
LOR!":? "  ";:GOSUB 1510:H=15:LINE=500
:? " ";:GOSUB 1370:CB=NMB*16
505 IF G=11 AND CB<>0 THEN CB=0:GOSUB
1630
510 ? " ";:GOSUB 1520:H=14:F=1:LINE=5
10:GOSUB 1370:GOSUB 1540:F=0
511 IF G=9 AND NMB<>0 THEN NMB=0:GOSUB
 1640
513 CB=CB+NMB
515 GOSUB 1560
520 ? "CHOOSE PLAYFIELD TYPE!":? "  NA
RROW=0":? "  REGULAR=1":? "  WIDE=2":?
 "?";:H=2:LINE=515:GOSUB 1370:PF=NMB
530 GOSUB 1560:? :? "PRIORITY CHOICES!
 NOTE THAT PLAYER 0":? "ALWAYS HAS PRI
ORITY OVER PLAYER 1!"
540 ? "TYPE DESIRED NUMBER.":? "  ALL
PLAYERS OVER PLAYFIELDS(0)":? "  PLAYE
RS 0 & 1 OVER PLAYFIELDS(1)"
550 ? "  ALL PLAYFIELDS OVER PLAYERS(2
)":? "  PLAYFIELDS 0 & 1 OVER PLAYERS(
3)"
560 ? "?";:H=3:LINE=530:GOSUB 1370:PR=
NMB
570 GOSUB 1560:? :? "WHERE DO YOU DESI
RE TO STORE PM DATA?":? "  ABOVE A LOW
ERED RAMTOP(TYPE 0)"
580 ? "  BENEATH THE DISPLAY LIST(TYPE
 1)"
590 ? "?";:H=1:LINE=570:GOSUB 1370:PMS
T=NMB
600 GOSUB 1560:? "CHOOSE SPEED OF MOVE
MENT.":? "  HALF SPEED(TYPE 0)":? "  N
ORMAL SPEED(TYPE 1)":? "?";
610 LINE=600:GOSUB 1370:SPD=NMB
611 GOSUB 1560:? "DO YOU WISH TO STORE
 THE VBI":? "ROUTINE IN A:":? "  STRIN
G(TYPE 0)":? "  IN PAGE 6(TYPE 1)"
612 ? "?";:L=0:H=1:LINE=611:GOSUB 1370
:PG=NMB
615 GOSUB 1560
620 ? :? "INDICATE NUMBER OF BYTES IN
PLAYER.":? "BOTH PLAYERS MUST HAVE SAM
E NUMBER.":? "MAXIMUM BYTES=10!"
630 L=1:H=10:? "?";:LINE=615:GOSUB 137
0:PB=NMB
640 DIM P0$(PB),P1$(PB)
650 FOR X=0 TO 4:QT0(X)=0:QT1(X)=0:RTN
0(X)=0:RTN1(X)=0:NEXT X:Y=0:Z=0
660 GOSUB 1560:? :? "TYPE IN DATA FOR
PLAYER ZERO.":? "START FROM TOP OF PLA
YER.":L=0:H=255:TRAP 1600
670 FOR X=1 TO PB
680 ? "?";:LINE=680:GOSUB 1370:IF E TH
EN X=X-1:NEXT X:GOTO 720
690 IF NMB=34 THEN QT0(Y)=X:P0$(X,X)="
 ":Y=Y+1:NEXT X:GOTO 720
700 IF NMB=155 THEN RTN0(Z)=X:P0$(X,X)
=" ":Z=Z+1:NEXT X:GOTO 720
710 P0$(X,X)=CHR$(NMB):NEXT X
720 IF NPL THEN GOSUB 1560:? :? "TYPE
IN DATA FOR PLAYER ONE":Y=0:Z=0
730 IF NPL THEN FOR X=1 TO PB
740 IF NPL THEN ? :? "?";:LINE=740:GOS
UB 1370:IF E THEN X=X-1:NEXT X:GOTO 77
5
750 IF NPL THEN IF NMB=34 THEN QT1(Y)=
X:P1$(X,X)=" ":Y=Y+1:NEXT X:GOTO 775
760 IF NPL THEN IF NMB=155 THEN RTN1(Z
)=X:P1$(X,X)=" ":Z=Z+1:NEXT X:GOTO 775
770 IF NPL THEN P1$(X,X)=CHR$(NMB):NEX
T X
775 TRAP 40000
780 GRAPHICS 0:? :? :? "LISTING PLAYER
 MOVEMENT":? "SUBROUTINE TO DISK"
790 OPEN #1,8,0,"D:PM.LST":RMTP=(8+(RA
M*8))*4:IF PMST THEN 850
800 IF RS=1 THEN OFS=8+8*(G>5):GOTO 82
0
810 OFS=4+8*(G=7)+12*(G>7)
820 ? #1;"31000 PM=PEEK(106)-";OFS;":P
OKE 106,PM:GR.";G;":POKE 54279,PM:PMBA
SE=256*PM"
830 PMB=(RMTP-OFS)*256:PL0=PMB+512+(51
2*(RS=1)):GOSUB 1580
840 IF NPL THEN PL1=PMB+640+(640*(RS=1
)):GOSUB 1590:GOTO 900
850 IF RS=2 THEN OFS=8*(G<5)+12*(G=5)+
16*(G=6)+24*(G=7)+36*(G>7):PMB=(RMTP-0
FS)*256
860 IF RS=1 THEN OFS=16*(G<6)+24*(G=6)
+32*(G=7)+40*(G>7):PMB=(RMTP-OFS)*256
870 PL0=PMB+512+(512*(RS=1)):GOSUB 158
0
880 IF NPL THEN PL1=PMB+640+(640*(RS=1
)):GOSUB 1590
890 ? #1;"31000 GR.";G;":PM=PEEK(106)-
";OFS;":POKE 54279,PM:PMBASE=256*PM"
900 ? #1;"31010 DIM ZERO$(47):ZERO$=";
CHR$(34);"hhh¬Lh¬Nh¬Mh¬Ph¬0%L&Pp▪ ♥┌M◢
P±fNJPv$0◢@▶p▪┌MPw◆";CHR$(34)
910 ? #1;"31020 X=USR(ADR(ZERO$),0,PMB
ASE,";1024+1024*(RS=1);")"
920 REGISTER=712-(2*(G=0 OR G=8))
930 ? #1;"31030 POKE 53256,";SZ0;":POK
E 53248,";HZST0;":POKE 704,";C0;":POKE
 ";REGISTER;",";CB;
940 IF NPL THEN ? #1;":POKE 53257,";SZ
1;":POKE 53249,";HZST1;":POKE 705,";C1
950 IF NPL=0 THEN ? #1;" "
960 ? #1;"31040 DIM P0$(";PB;"):P0$=";
CHR$(34);P0$;CHR$(34)
970 IF QT0(0)=0 THEN 995
975 ? #1;"31043 ";
980 FOR X=0 TO 4:Z=QT0(X):IF Z THEN IF
 X THEN ? #1;":";
985 IF Z THEN ? #1;"P0$(";Z;",";Z;")=C
HR$(34)";
990 NEXT X:? #1;" "
995 IF RTN0(0)=0 THEN 1030
1000 ? #1;"31047 ";
1005 FOR X=0 TO 4:Y=RTN0(X):IF Y THEN
IF X THEN ? #1;":";
1010 IF Y THEN ? #1;"P0$(";Y;",";Y;")=
CHR$(155)";
1020 NEXT X:? #1;" "
```

continued on next page

```
1030 IF NPL=0 THEN 1120
1040 ? #1;"31050 DIM P1$(";PB;"):P1$="
;CHR$(34);P1$;CHR$(34)
1050 IF QT1(0)=0 THEN 1075
1055 ? #1;"31053 ";
1060 FOR X=0 TO 4:Z=QT1(X):IF Z THEN I
F X THEN ? #1;":";
1065 IF Z THEN ? #1;"P1$(";Z;",";Z;")=
CHR$(34)";
1070 NEXT X:? #1;" "
1075 IF RTN1(0)=0 THEN 1120
1080 ? #1;"31057 ";
1090 FOR X=0 TO 4:Y=RTN1(X):IF Y THEN
IF X THEN ? #1;":";
1100 IF Y THEN ? #1;"P1$(";Y;",";Y;")=
CHR$(155)";
1110 NEXT X:? #1;" "
1120 P=512+(512*(RS=1))+STV0
1130 ? #1;"31060 FOR X=";PB-1;" TO 0 S
TEP-1:POKE PMBASE+";P;"+X,ASC(P0$(X+1,
X+1)):NEXT X"
1140 IF NPL=0 THEN 1170
1150 P=640+(640*(RS=1))+STV1
1160 ? #1;"31070 FOR X=";PB-1;" TO 0 S
TEP-1:POKE PMBASE+";P;"+X,ASC(P1$(X+1,
X+1)):NEXT X"
1170 ? #1;"31080 POKE 203,";PB+1;":POK
E 204,";PB+1;":POKE 1000,";STV0;":POKE
 1002,";PL0L;":POKE 1004,";PL0H;
1180 ? #1;":POKE 1006,";UPL0;":POKE 10
08,";LL0;":POKE 1010,";LFL0
1190 IF NPL THEN ? #1;"31090 POKE 1001
,";STV1;":POKE 1003,";PL1L;":POKE 1005
,";PL1H;
1200 IF NPL THEN ? #1;":POKE 1007,";UP
L1;":POKE 1009,";LL1;":POKE 1011,";LFL
1
1210 ? #1;"31100 POKE 1012,";HZST0;":P
OKE 1014,";RTL0
1220 IF NPL THEN ? #1;"31110 POKE 1013
,";HZST1;":POKE 1015,";RTL1
1230 ? #1;"31115 DIM PM$(211)"
1240 ? #1;"31120 PM$(1,65)=";CHR$(34);
"▀▼=x▯)▯P▯p%=x▯)▯P▯pW=x▯)▯P▯pH=x▯)◢P▯p
9h+▯p▯PULbd=h▯(◢j┴]n▯▯0+h▯Hj";CHR$(34)
1250 ? #1;"31130 PM$(66,128)=";CHR$(34
);"=j▯┐M=|▯┐N1M◢j┌MHHjFK▯s%L┐K▯▯.p\▯1▯
8pB▯=0;=h▯(Hj┴]p▯0++h▯FKFKFK";CHR$(34)
1260 ? #1;"31140 PM$(129,196)=";CHR$(3
4);"jjHFKP±%L┐K=j▯┐M=|▯┐N1MHj┌M◢◢jFK▯s
%L┐K▯▯8<t▯◢j┴]r▯▯/+t▯+♥P▯▯&<t▯Hj┴]";
1265 ? #1;CHR$(34):? #1;"31142 PM$(197
,211)=";CHR$(34);"v▯p▯0++t▯+♥P▯▯▯";CHR
$(34)
1270 IF NPL THEN 1290
1280 ? #1;"31145 PM$(41,41)=CHR$(1)"
1290 IF SPD THEN ? #1;"31147 PM$(54,54
)=CHR$(136):PM$(65,65)=CHR$(200):PM$(7
9,79)=CHR$(136):PM$(84,84)=CHR$(200)"
1300 IF SPD THEN ? #1;"31148 PM$(113,1
13)=CHR$(200):PM$(129,129)=CHR$(198):P
M$(130,130)=CHR$(203)"
1310 IF SPD THEN ? #1;"31149 PM$(153,1
53)=CHR$(200):PM$(158,158)=CHR$(136):P
M$(174,174)=CHR$(136):";
1311 IF SPD THEN ? #1;"PM$(194,194)=CH
R$(200)"
1315 IF PG THEN ? #1;"31150 FOR X=0 TO
 210:POKE 1536+X,ASC(PM$(X+1,X+1)):NEX
T X"
1320 ? #1;"31155 DIM SET$(11):SET$=";C
HR$(34);"h█ █ ▌◥ \d●";CHR$(34);
1321 IF PG=0 THEN ? #1;":AD=ADR(PM$):H
I=INT(AD/256):LO=AD-256*HI"
1322 IF PG THEN ? #1;" "
1325 IF PG=0 THEN ? #1;"31160 SET$(3,3
)=CHR$(LO):SET$(5,5)=CHR$(HI):X=USR(AD
R(SET$))"
1326 IF PG THEN ? #1;"31160 SET$(3,3)=
CHR$(0):SET$(5,5)=CHR$(6):X=USR(ADR(SE
T$))"
1330 P=44+(16*(RS=1))+(1*(PF=0)+2*(PF=
1)+3*(PF=2)):? #1;"31190 POKE 559,";P;
1340 P=1*(PR=0)+2*(PR=1)+4*(PR=2)+8*(P
R=3):? #1;":POKE 623,PEEK(623)+";P;":P
OKE 53277,3"
1350 ? #1;"32000 RETURN"
1360 CLOSE #1:CLOSE #3:GOSUB 1560:? "F
ILE ON DISK IS CALLED 'PM.LST'":? "TO
MERGE WITH YOUR PROGRAM,USE ENTER!":EN
D
1370 A=PEEK(16)-128:IF A<0 THEN 1390
1380 POKE 16,A:POKE 53774,A
1390 XX=1:NMB$="":E=0
1400 GET #3,A:? CHR$(A);:Z$=STR$(0)
1410 IF A=155 THEN 1470
1420 IF A=32 THEN ? :? "◥ABORTING NUMB
ER.CHOOSE AGAIN.":GOSUB 1530:E=1:POP :
GOTO LINE
1430 IF A<48 OR A>57 THEN ? :GOSUB 150
0:E=1:POP :GOTO LINE
1440 IF F=1 THEN FOR YY=1 TO LEN(NA$):
IF A=ASC(NA$(YY,YY)) THEN POP :? :GOSU
B 1500:E=1:POP :GOTO LINE
1450 IF F=1 THEN NEXT YY
1460 NMB$(XX,XX)=CHR$(A):XX=XX+1:GOTO
1400
1470 IF LEN(NMB$)=0 THEN GOSUB 1500:PO
P :E=1:GOTO LINE
1480 NMB=VAL(NMB$):IF NMB<L OR NMB>H T
HEN GOSUB 1500:POP :E=1:GOTO LINE
1490 ? :RETURN
1500 ? "◥INCORRECT RESPONSE! PLEASE TR
Y AGAIN!":GOSUB 1530:RETURN
1510 ? "HUE(0-15)?";:RETURN
1520 ? "LUMINANCE":? "      (EVEN NUMBER
 0-14)?";:RETURN
1530 FOR Q=1 TO 100:NEXT Q:RETURN
1540 IF NMB=1 OR NMB=11 OR NMB=13 THEN
 GOSUB 1500:E=1:POP :GOTO LINE
1550 RETURN
1560 FOR T=10 TO 6 STEP -1:FOR S=8 TO
0 STEP -1:SOUND 0,15-S,10,T:NEXT S:NEX
T T:SOUND 0,0,0,0:RETURN
1570 NMB=(NMB-(127+128*(RS=1)))*-1:RET
URN
```

continued on page 115



GARBAGE COLLECTOR

Clearing unwanted characters from strings.

by HARVEY BRANCH

You print a string and suddenly it looks like Valentine's Day with all those little hearts. One result of adventuresome programming in ATARI BASIC can be the appearance of this and other types of data garbage in strings, arrays and matrices. Garbage data not only ruins the appearance of PRINTs but also is a source of program errors. While the standard procedures for avoiding this difficulty are effective, they can be very slow and tedious. This article shows how to speed up programs with a fast technique for clearing unwanted garbage from memory through the use of ATARI BASIC's very flexible string-handling features.

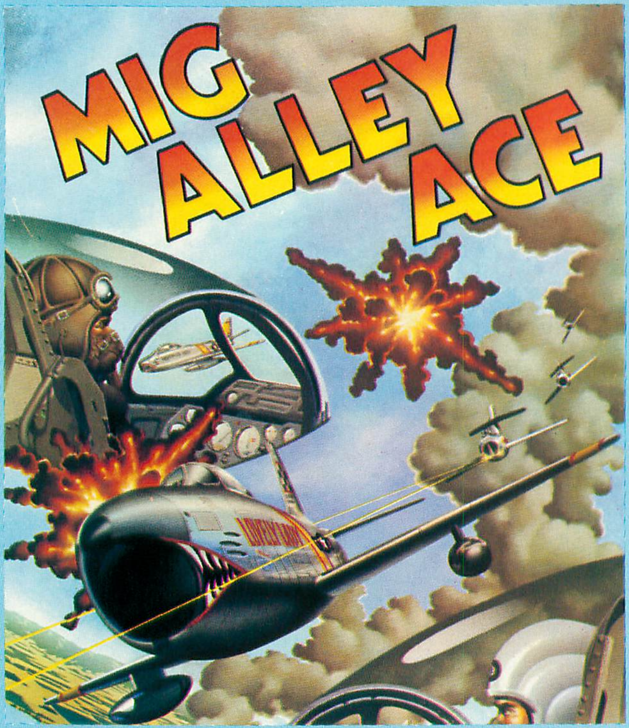
First, here is a little background to help you understand how garbage data accumulates. In ATARI BASIC, string, array and matrix data are not stored at fixed RAM addresses. They are mixed together in a block of memory called the string/array area that is created as needed by reserving memory space above the BASIC program data. The actual RAM locations of this reserved area move with the changes in the length of the BASIC program or with the use of the Direct Mode. With this "moving target" situation, BASIC does not clear (erase) old data from RAM each time a string/array area is created

continued on page 79

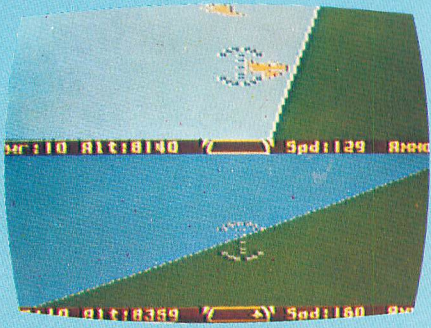
The Combat Challenge!!

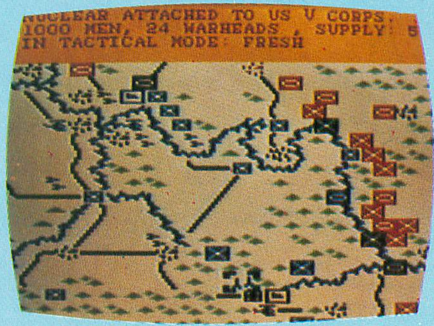
Can you use your skill, cunning, and guts to survive and win REAL-LIFE, REAL-TIME combat simulations from MicroProse?

— From the creators of Hellcat Ace!









MIG ALLEY ACE is a split screen, aerial combat simulation using three-dimensional, out the cockpit graphics, and requiring real fighter pilot skills and maneuvering against another player or the computer. Each player has his own out the cockpit view and must skillfully maneuver to shoot down the other player. This outstanding aerial combat simulation of Korean Conflict air battle will thrill and challenge you as you practice to earn the silver wings of a real fighter pilot! For ATARI and Commodore 64 computers on Disk or Cassette . . . $34.95.

NATO COMMANDER is a full scrolling, European Continent, strategic, accelerated REAL-TIME wargame requiring arcade speed decisions to analyze and react to the combat reports from the battlefront during a Soviet Block invasion of Europe. The Nato Commander has air power, tactical nuclear weapons, combat forces from all Nato countries, and many different combat unit types to stop the Soviet advance and prevent a Thermonuclear World War III!! This exciting REAL-TIME simulation requires combat reflexes and Joint Chiefs of Staff thinking to save Europe from destruction! For ATARI and Commodore 64 on Disk or Cassette . . . $34.95

Look for MicroProse's exciting new flight simulator, SOLO FLIGHT for realistic takeoffs, landings, and cross-country flying practice. Write or call for our Free Catalog.

If you cannot find our games at your local store, you can order by MasterCard or VISA, Money Order, COD or Check. Add $2.50 for Postage and Handling. Maryland residents add 5% sales tax.

MicroProse Software

DEALER INQUIRIES INVITED.

10616 Beaver Dam Road, Hunt Valley, MD 21030

(301) 667-1151

by DIMensioning. Only when the ATARI 400/800 is first turned "on" does the power-up routine clear almost all of RAM by resetting each byte to zero. As your ATARI grinds away at its various activities, data is stored into RAM, used, and then left there, loading RAM with non-zero "garbage." So, when you create a string, array or matrix, you can never be quite sure what data may already exist in the block of memory that has been reserved for it.

Although it is true that ATARI BASIC does not automatically clear out strings and arrays, it should be noted that garbage does not just jump into strings and arrays. It is the programmer's responsibility to ensure that such areas are clear, and once he has done so, they will contain only what the program stores. If garbage appears after initialization, it is almost always the fault of the programmer.

Therefore, ATARI's *BASIC Reference Manual* cautions that it is your responsibility to clear, or initialize, arrays and matrices early in a program by setting them to zero. No such recommendation is made for strings. For simple string functions, BASIC keeps track of string data quite efficiently and ignores the garbage. It is when *you* start taking control of strings by using subscripting, string splitting, and concatenation that the garbage data problem can arise. In this case, the initialization of strings becomes a good practice. Strings are not initialized to zero, however, because zero represents that little heart in ATARI's ATASCII character set. To get a blank or "empty" string, each byte has to be set to the decimal ATASCII value "32" which returns a space when a string is PRINTed.

Initializing can be a time-consuming effort since there is no direct command in BASIC to clear RAM bytes. Commands such as NEW, CLR, and GRAPHICS 0, and keyboard functions such as CLEAR and SYSTEM RESET only clear the screen display or specific pointers and tables. Therefore, the usual method to clear arrays or matrices is with individual FOR/NEXT loops. This is often slow and cumbersome, especially when large matrices must be cleared. A fast way to reset strings is shown in ATARI's *De Re Atari:*

```
10 DIM A$ (1000)
20 A$ (1) = "X": A$ (1000) = "X"
30 A$ (2) = A$
```

Note: Although the number 1 in parentheses after A$ in line 20 is not necessary, it is included here for clarity.

This routine will reset each of the 1000 characters in A$ to "X", or to any other desired character, at machine language speed. It is fast and simple, but you still must write two lines of code for each string to be reset. Moreover, this rapid reset routine does not work for arrays or matrices.

It is possible to avoid these limitations by using ATARI BASIC's unlimited string length and its unique ability to address a string to any desired target area of RAM memory, even to locations that are already addressed as memory locations of other strings, arrays or matrices. We can clear the entire string/array area in just one operation by addressing a single large string to include all of the reserved memory block and then clearing this one string with the rapid reset routine. Most likely, you will want to do this in two steps to reset strings separately from arrays and matrices.

There are several ways to address a string to a specific RAM memory area. A very direct approach is to manipulate an address pointer called ENDSTAR which determines the memory location to which a string is addressed when it is DIMensioned. The string/array area is defined by two pointers — STARP, the memory address of its low end, and ENDSTAR, which is at the first byte above its high end. When a string is DIMensioned, the low end of its data block is placed at ENDSTAR. ENDSTAR then is moved up in memory by the number of bytes specified in the DIMension statement to the next byte beyond the new string's high end. Arrays and matrices go into the area in a similar way. Each new data block is added to the top of the area and the items are arranged in memory in the exact order in which they are DIMensioned. However, we can take control of ENDSTAR and temporarily change it, or "misdirect" it, to DIMension a string to a specific RAM location.

The following program fragment illustrates how to accomplish this. I will discuss each step in detail. For simplicity, the discussion refers to strings and arrays but matrices can be intermingled with arrays and handled identically.

```
10 DIM P1$(1), [all strings], P2$(1), [all arrays], P3$(1)
20 S = ADR(P2$)-ADR(P1$):
   A = ADR(P3$)-ADR(P2$)
30 POKE 143, INT(ADR(P1$)/256):
   POKE 142, ADR(P1$)-256*PEEK(143)
40 POKE 144, PEEK(142): POKE 145, PEEK(143)
50 DIM RS$(S), RA$(A + 1)
60 RS$(1) = CHR$(32): RS$(S) = CHR$(32)
70 RS$(2) = RS$
80 RA$(1) = CHR$(0): RA$(A + 1) = CHR$(0)
80 RA$(2) = RA$
```

Note: do not type the brackets and bracketed material in line 10. Instead, insert all strings to be dimensioned between P1$ and P2$, and insert all arrays to be dimensioned between P2$ and P3$.

It is assumed that the main program has both strings and arrays to clear. They will be handled separately because we want all array data to be "0" and all string data to be "32". To do this we first get the string data together in one group and the array data in another group by DIMensioning them in the proper order. One-byte pointer strings are used to mark the start and end of these groups. Remember, these items are in the string/array area in the exact order that they are DIMensioned in line 10. Line 20 calculates the total number of bytes of RAM included in each group by using the pointer strings to provide memory addresses.

Now we are ready to create the two large strings that will handle the clearing of these two groups. The first will span the string data locations between pointer strings P1$ and P2$. In line 30 ENDSTAR moved to the P1$ byte by converting the address of P1$ to two-byte format and poking into ENDSTAR's address record at memory locations decimal 142 and 143. Then, comes a bit of housekeeping where we POKE the

continued on page 81

AT LAST!!! A REAL FLIGHT SIMULATOR!!!

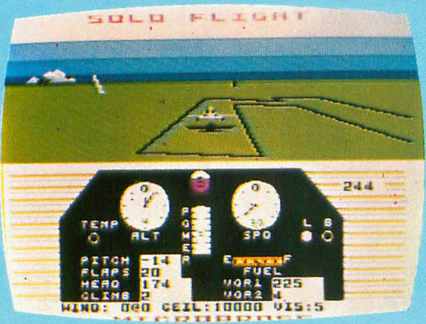
— From The Creators of HELLCAT ACE!

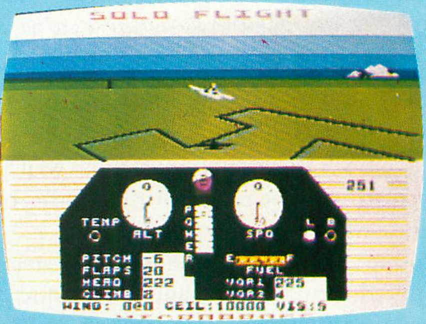
A real flight simulator allows the pilot to practice takeoffs, landings, cross-country navigation, and emergency procedures in Day, Night, Cross-Wind, and Instrument Flying scenarios! This practice requires realistic three-dimensional terrain graphics, actual instrument panel configurations, and a realistic simulation of the thrill and challenge of the flight experience! The experienced fighter pilots of MicroProse bring you the excitement and joy of flying with SOLO FLIGHT!

- Three Dimensional Terrain Graphics
- Multiple Airports and Runways
- Dual Radio Navigation Instruments
- Full Feature, Actual Configuration Instrument Panel
- Multiple Air Navigation Charts
- Instrument Approaches



- Takeoffs
- Landings
- Cross-Country Navigation — Day, Night, VFR and IFR Flying
- Emergency Procedures Practice
- Air Mail Delivery Game for 1-4 Players
- Smooth Landing & Good Navigation Scoring
- For All Atari Computers, Disk or Cassette . . . $34.95
- Coming Soon for Commodore 64





Look for MicroProse's two new exciting real time combat simulations — MIG ALLEY ACE & NATO COMMANDER. Write or call for our Free Catalog.

If you cannot find our games at your local store, you can order by MasterCard or VISA, Money Order, COD or Check. Add $2.50 for Postage and Handling. Maryland Residents add 5% Sales Tax.

MicroProse Software

DEALER INQUIRIES INVITED.

10616 Beaver Dam Road, Hunt Valley, MD 21030
(301) 667-1151

MEMory TOP pointer, decimal 144 and 145, to the new ENDSTAR location since they must move together.

In line 50 RS$ is created at P1$ and is DIMensioned to span the length of the string data group. This automatically moves ENDSTAR to the P2$ byte. RA$ is created there and DIMensioned to span the array data group from P2$ to P3$ with ENDSTAR and MEMTOP moving to one byte beyond the P3$ byte, which is where they started. With the two reset strings properly addressed, the rapid reset routine is used to clear each group of data in lines 60-90. Be careful to put each routine on two lines in the exact manner shown here. This is good practice to follow because the rapid reset routine does not always seem to work when compressed into one logical line.

This program fragment is usable in various ways. You might put it in the form shown at the start of a program to initialize all strings and arrays on each RUN. Or, lines 60-90 can be put in the form of subroutines to clear items whenever called from the program. As an example, add these lines to the fragment:

```
 75 ERASE = 80: GOTO 110
100 RETURN
110 GOSUB ERASE
```

All strings and arays will still be cleared on RUN, but the arrays can be cleared at any time by simpling calling GOSUB ERASE. Add other pointer and reset strings and you will be able to gain great flexibility in clearing or resetting various groups of data during program execution. Just be careful not to POKE the MEMTOP pointer around as part of a subroutine or FOR/NEXT loop because you will generate an ERROR condition.

The program listing is a simple demonstration of the speed of this garbage collector compared to the usual FOR/NEXT loop. To save typing, there are ten matrices of the same 10x10 size which are cleared with only one double FOR/NEXT loop. In a typical program, a number of separate loops would be required for the different matrix sizes. Before you run this program, do you know the amount of RAM memory which must be cleared for these ten matrices? You may be surprised, especially if you have an 8K machine.

```
1 REM ***GARBAGE COLLECTOR DEMO***
1Ø GRAPHICS Ø:POKE 752,1:POKE 82,Ø
2Ø ? :? "     DEMO OF FAST ARRAY RESETT
ING"
3Ø ? :? "  (ELAPSED TIME FOR TEN 1Ø X
1Ø ARRAYS)"
4Ø FOR DELAY=1 TO 1ØØØ:NEXT DELAY
5Ø DIM P1$(1),B(9,9),C(9,9),D(9,9),E(9
,9),F(9,9),G(9,9),H(9,9),I(9,9),J(9,9)
,K(9,9),P2$(1)
6Ø ? :? :? "NOW RESETTING WITH OLD FOR
.. NEXT LOOP"
7Ø POKE 18,Ø:POKE 19,Ø:POKE 2Ø,Ø:REM S
ET CLOCK
8Ø FOR X=Ø TO 9:FOR Y=Ø TO 9
9Ø B(X,Y)=Ø:C(X,Y)=Ø:D(X,Y)=Ø:E(X,Y)=Ø
:F(X,Y)=Ø:G(X,Y)=Ø:H(X,Y)=Ø:I(X,Y)=Ø:J
(X,Y)=Ø:K(X,Y)=Ø
1ØØ NEXT Y:NEXT X
11Ø TIME=(PEEK(2Ø)+256*PEEK(19)+256*25
6*PEEK(18))/6Ø
12Ø ? :? "        TIME WAS ";TIME;" SEC."
13Ø ? :? :? "GET READY FOR NEW FAST RE
SET";
14Ø A=ADR(P2$)-ADR(P1$)
15Ø POKE 143,INT(ADR(P1$)/256):POKE 14
2,ADR(P1$)-256*PEEK(143)
16Ø POKE 144,PEEK(142):POKE 145,PEEK(1
43)
17Ø DIM RA$(A+1)
18Ø FOR DELAY=1 TO 1ØØØ:NEXT DELAY
19Ø ? "--GO!":POKE 19,Ø:POKE 2Ø,Ø
2ØØ RA$(1)=CHR$(Ø):RA$(A+1)=CHR$(Ø)
21Ø RA$(2)=RA$
22Ø TIME=(PEEK(2Ø)+256*PEEK(19))/6Ø
23Ø ? :? "          TIME WAS ";TIME;" SEC
."
24Ø ? "        TO RESET ";A+1;" BYTES"
25Ø POKE 82,2:POKE 752,Ø
```

TYPO TABLE

Variable checksum = 292352

Line num range	Code	Length
1 - 7Ø	RH	542
8Ø - 16Ø	PX	5Ø3
17Ø - 25Ø	GN	331



BUYER'S GUIDE

Antic is pleased to present our annual Buyer's Guide. This guide is a collection of old standbys and new products as suggestions for your holiday gift giving. All of us here at Antic Publishing wish you a happy holiday season.



BUYER'S GUIDE

COMPUTERS

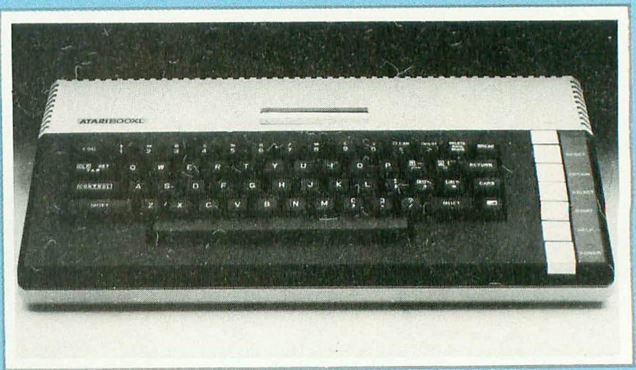


600XL HOME COMPUTER

Atari, Inc.
$199.00

NEW

Designed for beginners, this personal computer can grow with the user's ability and needs. 16K RAM can be ballooned to 64K, while built-in BASIC, full-stroke keyboard, and a self-help key all contribute to ease of use. Other features include an expansion bus, cartridge slot and, of course, joystick ports.

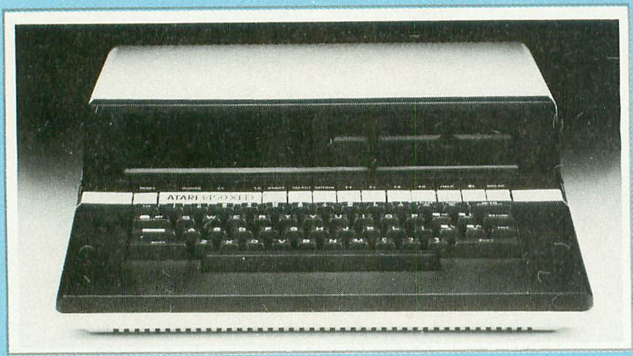


800XL HOME COMPUTER

Atari, Inc.
$299.00

NEW

The 800XL will probably be the workhorse of the new Atari line. With full 64K memory available, and BASIC built in, it can do — or can be connected to peripherals to do — anything any general-purpose microcomputer should do. The new Operating System is compatible with all earlier Atari software and devices legally designed according to Atari specifications.



1450XLD HOME COMPUTER

Atari, Inc.
$999.00

NEW

Seekers of Atari's holy grail can stop here. This top-of-the-line, deluxe system is the last word in the integration of Atari computer capabilities. It contains all of the features of the 1400XL, as well as a built-in, double-sided, dual-density disk drive (repeat *that* several times quickly!) which provides 256K storage per disk. A second drive can be installed in the same housing.



1400XL HOME COMPUTER

Atari, Inc.
$549.00

NEW

Modem *and* speech synthesizer are housed under the same roof in this ambitious, 64K Atari computer. Selected programs can be easily worked via one-touch cursor control. Built-in BASIC, TV and monitor outputs, four programmable-function keys, and a fullstroke board of 66 keys complete the impressive list of features.

DISK DRIVES

1050 DUAL-DENSITY DISK DRIVE WITH DOS 3.0

Atari, Inc.
$449.00

NEW

Store and retrieve your computer programs and important data with this streamlined, single-sided disk drive. It operates quietly in both single and enhanced-density modes, and comes with DOS 3.0. Novices will find the updated beginner's manual a valuable aid, and an all-new technical manual is handy, too. With its 127K bytes per disk (100 pages) in enhanced density and a maximum transfer rate of 19.2 Kbps, this drive will appeal to many Atari users.



RANA 1000

Rana Systems
21300 Superior St.
Chatsworth, CA 91311
(800) 421-2207
(800) 262-1221

The long awaited Rana drives have hit the market as an economical alternative to previous drives. They are low profile and quiet, though not yet equipped for double density. Five function buttons and an LED display status of machine operation.

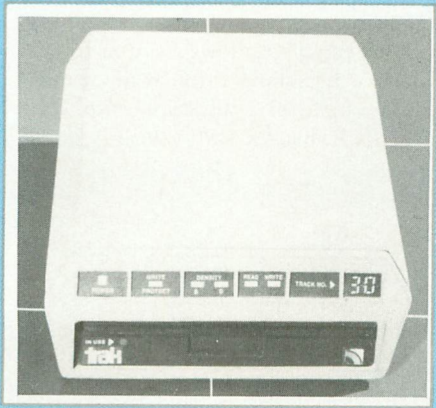


GT DISK DRIVE

Indus
9304 Deering Ave.
Chatsworth, CA 91311
(213) 882-9600
$449.00

NEW

According to Indus, the GT "looks like a Ferrari, drives like a Rolls, and parks like a Beetle." Though it contains standard drive elements, such as single-density and double-density DOS 3.0, and digital display, it also offers a sleek design style. The unit arrives in a portable carrying case, in which your disk library can be stored; its built-in, plexiglass dust cover features push-button, up-and-down motion. Included with purchase are a database program, a word processor, and a spreadsheet program.



AT-D1 and AT-D2

Trak Microcomputer Corporation
1511 Ogden Ave.
Downers Grove, IL 60515
(312) 968-1716
$469.00 (single density)
$499.00 (double density)

These two new intelligent drive systems — single and double density — feature an on-board microprocessor and programmed memory, and they're only 3″ high! Any Centronics-type printer will plug directly into the drive, eliminating the need for an interface. A digital track counter tells you where every bit of data is located.



ASTRA 1620

Astra Systems
5230 Clark Ave.
Lakewood, CA 90712
(213) 804-1475
$595.00

NEW

Experience the convenience of multiple drives with this double-disk drive. This is like getting two drives for the price of one. It can be obtained in single or double density. When used as double density, it has the same capacity as four Atari 810s.

PERCOM DATA AT-88

Percom Data Corp.
11220 Pagemill Rd.
Dallas, TX 75243
(800) 527-1222
$488.00

Percom's AT-88 offers 88 formatted Kbytes in single-density, and can be smoothly attached to your Atari via a plug-in system. Other features are integral power supply, "no-patch" to Atari DOS, and critical constant-speed regulation.

MODEMS

CERMETEK 212A

(modem)
Micro Systems Exchange
P.O. Box 4033
Concord, CA 94524
(415) 355-7130
$560.00

A bilingual modem, the 212A communicates at both 1200 baud and 300 baud — using DSPK and FSK signaling techniques. It connects via a standard phone line and includes a convenient auto-dialer. You select from a menu of standard options and can develop custom features entirely in software.

1080 VERSAMODEM

Bizcomp
P.O. Box 7498
Menlo Park, CA 94025
(408) 745-1616
$139.00

NEW

A new direct-connect modem that can be used for remote databank acceses, time-sharing, stock broker systems, videotex and electronic mail. You can link to The SOURCE, CompuServe, Dow Jones and other information utilities as well as on-line services via standard data terminals. VersaModem operates at 300 baud or below, using Bell Standard 103 protocol.

continued on next page



BUYER'S GUIDE



BUYER'S GUIDE



AM/FM LOADER

Microperipheral Corp.
2565 152nd Ave., N.E.
Redmond, WA 98052
(206) 881-7544
$69.88

NEW

As radio stations and cable operations begin to download computer programs, this receive-only modem may be in demand. It operates at speeds up to 4800 baud, but can get worked up to 9600 baud to allow for four-second downloading of any video game.



VOLKSMODEM

Anchor Automations
6624 Valjean Ave.
Van Nuys, CA 91406
(213) 997-6493
$79.95; $12.95 for each cable

Your search for an inexpensive 300-baud originate/answer modem should lead to the Volksmodem. Five different cables are available to connect it to almost any computer terminal, making it compatible with most systems. A hybrid of the direct/connect and acoustic modems, it has no cups, yet allows the user to monitor line status through the telephone. Includes a subscription to *The SOURCE*, itself a $100 value.

SURGE PROTECTORS

NO ZAP

KIS Engineering
10D College Lane
Methuen, MA 01844
$12.95 plus $2.00 postage and handling

Keep static electricity from causing you uncomfortable shock or crashing your computer system. To save you or your Atari from getting "zapped", install this small inexpensive peripheral next to your keyboard.

VOLTAGE-SURGE SUPPRESSOR

PANAMAX
150 Mitchell Blvd.
San Rafael, CA 94903
(415) 472-5547
$127.00 (includes noise-filter option)

For Atari systems the manufacturer recommends the four-outlet unit, SS120/4LCSN, which handles both surge and noise. Unit has a response time of one trillionth of a second and clamps the voltage well below damaging levels.

THE DATASAVER

Cuesta Systems, Inc.
3440 Roberto Court
San Luis Obispo, CA 93401
(805) 541-4160
$395.00 — 90 watt
$695.00 — 200 watt

Don't let interference or power outages destroy all your programming efforts. This battery-powered backup unit is available in 90 watt and 200 watt capacities. Both versions utilize a precision frequency standard and provide overvoltage suppression and EMI noise filtering.

SPIDER PAC AND BLACK MAX

Compu-Tech
P.O. Box 5058
Glendale, AZ 85306
(602) 979-2100
$134.95 Spider Pac
$124.95 Black Max

Plug all your system components into one power source, the Spider Pac, designed for Atari computers and peripherals. It sports a row of five 9-VAC outlets, five detachable power cords and three 120-VAC outlets. Other features include a 15-amp circuit breaker, illuminated on/off switch, spike protection, EMI filtration and RFI filtration. Black Max is a six-outlet spike filter with a mounting bracket, and a remote on/off switch so you can stop crawling under the desk.

TOUCH TABLETS

TOUCH-TABLET CONTROLLER

Atari, Inc.
$79.95

NEW

With the wave of a wand (actually a stylus with a switch), over 1500 colors and patterns are at your command. The 4½″ × 6″ drawing area can accommodate your masterpieces while instantly transferring them to the screen. The package also includes an Atari Artist cartridge.



KOALAPAD

Koala Technologies Corporation
4962 El Camino Real, Suite 125
Los Altos, CA 94022
(415) 964-2992
$125.00 (including software)

Koalapad is a small, lightweight, touch tablet that can reproduce drawn or written images, serve as a custom keyboard, move cursors or objects around a video display, and act as a game controller. Comes with software for basic painting, drawing and graphics.

POWER PAD

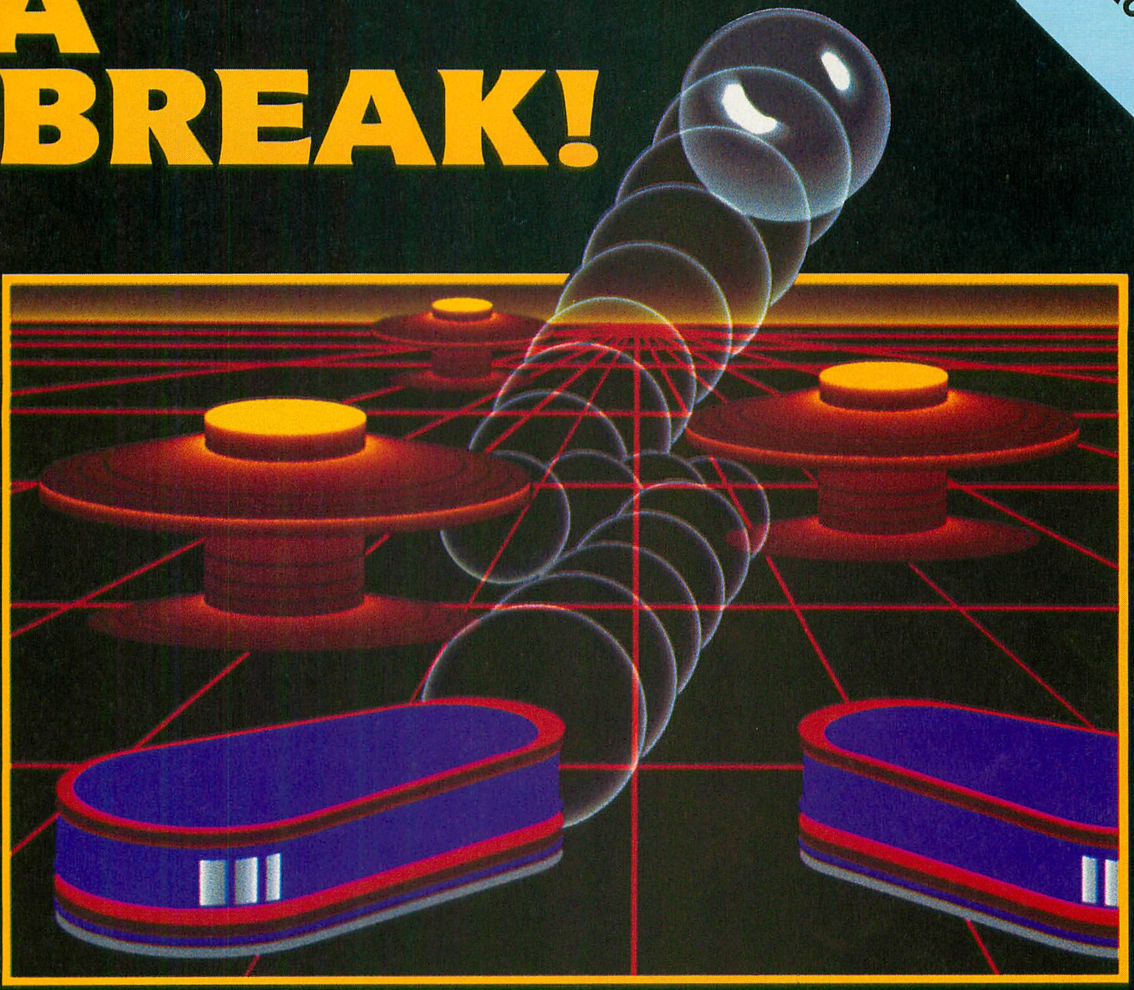
Chalk Board, Inc.
3772 Pleasantdale Rd., Suite #140
Atlanta, GA 30340
(800) 241-3989
$99.95

NEW

At one square foot in size, Power Pad appears to be the largest touch tablet on the market. Its multiple-contact-point surface allows the user to draw in more than one area of the board at a time. An entire software collection, dubbed *Leonardo's Library*, has been developed for use with the product; however, it must be purchased separately. *continued on page 88*

For Atari computers with 32K or more memory

TAKE A BREAK!



WITH NIGHT MISSION

PINBALL

You deserve the best. You've earned it. Now reward yourself with a session of Night Mission PINBALL, the most realistic and challenging arcade simulation ever conceived! ■ Stunning graphics and dazzling sound effects put Night Mission PINBALL in a class by itself. Game features: multi-ball and multi-player capabilities, ten different professionally designed levels of play, and an editor that lets you create *your own* custom modes. ■ So take a break with Night Mission PINBALL from SubLOGIC. Winner of *Electronic Games* magazine's 1983 Arcade Award for Best Computer Audio/Visual Effects.



See your dealer . . .

or write or call for more information. For direct orders please add $1.50 for shipping and specify UPS or first class mail delivery. Illinois residents add 5% sales tax. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800/637-4983

subLOGIC Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995



BUYER'S GUIDE

continued from page 86

MEMORY EXPANSION

ATARI 400 48K UPGRADE KIT
Micro Systems Exchange
P.O. Box 4033
Concord, CA 94524
(415) 355-7130
$99.95

This kit contains the necessary chips, wiring and resistors to upgrade the Atari 400 to a 48K computer. The instructions are designed for the novice, and lead through a *simple* installation procedure.

Use your current memory board so as not to change in any way the designed features of the Atari 400. The memory chips *replace* the chips on the memory board (all are pop-outs). Several small wires must be soldered.



64K RAM SELECT
Mosaic Electronics
P.O. Box 708
Oregon City, OR 97045
(503) 653-7885
$199.00
$29.95, Cable connector #1
$29.95, Cable connector #2

This product makes available four banks of 4K RAM above the normal 48K limit. You get 48K RAM hard-wired memory plus four 4K RAM banks of software-selectable additional memory for 52K of RAM continuous and 64K RAM total. ROM cartridges will not interfere with this product, and its memory is fully compatible with the 400/800 and all Atari software and peripherals.

RAMCRAM PLUS 48K
Axlon, Inc.
170 N. Wolfe Road
Sunnyvale, CA 94086
(408) 730-0216
$229.95

Atari 400 owners can expand their memory to 49,062 bytes of RAM (48K) with this new, easy-to-install module. This plug-in compatible board requires no soldering and you need only a screw-driver to begin using it in ten minutes.

THE POWER MODULE
AMIGA Corporation
3350 Scott Boulevard
Santa Clara, CA 95051
(408) 748-0222
$44.95

An alternative to ROM cartridges for the Atari VCS. Plugged into the game machine, it provides 6K RAM and a microprocessor to receive and use game programs loaded from a cassette recorder. Pre-programmed tapes for the module are much cheaper than ROM cartridges, and the extra RAM enhances graphics and play.

PRINTERS

For information on printers, consult our January 1984 issue. Extensive coverage will be provided there.

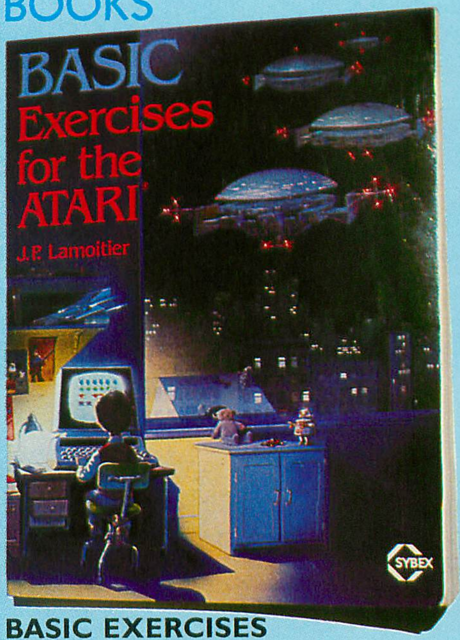
CONTROLLERS

For information on controllers, consult the ANTIC PIX CONTROLLERS section in this issue.

TRACK-ADAPT
NEW
ACECO
P.O. Box 691-A
Hicksville, NY 11802
(516) 733-3499
$9.95
$2.00 for shipping and handling

Two controllers for two-player games are no longer needed when Trak-Adapt plays too. Both people may use the same track-ball or joystick without having to switch game ports. It can be used with controller extension cables and helps eliminate clutter from the gaming area.

BOOKS



BASIC EXERCISES FOR THE ATARI
SYBEX
2344 Sixth Street
Berkeley, CA 94710
(415) 848-8233
258 pages
$12.95

Step-by-step examples show how to solve problems with Atari BASIC. You will learn programming techniques to do mathematical, financial and statistical computations as well as write games and data processing. Can be used with the Atari 1200XL.

ADVANCED PROGRAMMING TECHNIQUES FOR YOUR ATARI, INCLUDING GRAPHICS AND VOICE PROGRAMS
NEW
Tab Books, Inc.
Blue Ridge Summit, PA 17214
(717) 794-2191

The book's lengthy title is an apt description of its content. For the computerist who understands BASIC, but wishes to go beyond its limitations. Written by Linda M. Schrieber, a professional programmer and co-owner of an educational software firm.

THE DIRECTORY OF SOFTWARE PUBLISHERS: HOW AND WHY TO SELL YOUR PROGRAM
NEW
Van Nostrand Reinhold
153 W. 50th St.
New York, NY 10020
(212) 265-8700

Assume you've just created the most brilliant program in the world, but you don't know what to do next. If your intent is to share it with the rest of us, as

well as collect a few dollars, this guide will be of service to you. It delivers the inside scoop on software publishers; who is buying and what is selling. Also, legal areas, such as copyrighting, marketing agreements, and contracts are covered.

THE COMPUTER TUTOR: ATARI HOME COMPUTER EDITION

Little, Brown and Co.
34 Beacon St.
Boston, MA 02106
(617) 227-0730

NEW

Youngsters *may* move out the sandbox and into introductory portfolio management with the help of this text. Designed for parents and teachers who wish to work on computer skills with children, this 350 page book allows the youths to work on math and verbal skills, learn the metric system, and play the stock market, while the adults modify and personalize the programs.

WORDSTAR IN EVERYDAY ENGLISH

Devin-Adair Publishers
143 Sound Beach Ave.
Old Greenwich, CT 06870
(203) 637-4531
$9.95

NEW

Penned by a journalist who was initially reluctant to give up her electric typewriter, this book makes word processing simple for even the most computer illiterate. It is organized by the task required, and not by computer function. Over 200,000 sold.

USMI: MARKET DIRECTORY

Technique Learning Corp.
40 Cedar St.
Dobbs Ferry, NY 10522
(914) 693-8100
$195.00 including all six updates

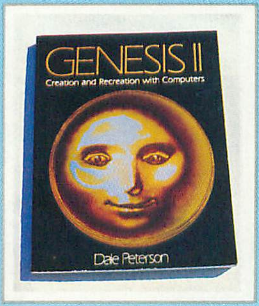
NEW

Published in a looseleaf format, this current and comprehensive profile of software publishers is updated and expanded six times per year. All information is obtained firsthand, and includes important tidbits, such as product line descriptions, ordering policies, contact names, and much more. The publishers are also cross-referenced in six ways for easy access.

INSIDE ATARI BASIC

(book)
Reston Publishing Co., Inc.
Reston, VA 22090
$12.95

"Friendly" is the word to describe this introduction to Atari BASIC. Illustrations and examples provide a walking tour through the bewilderness of BASIC. It's as good a start as you can get before leaving the beaten path. Includes simple color and sound commands.



GENESIS II

Reston Publishing Co.
11480 Sunset Hills Rd.
Reston, VA 22090
(800) 336-0338
$15.95 paperback
$24.95 hardback

Author Dale Peterson presents the relationship between technology and the arts from Da Vinci to Warhol to the makers of *Star Wars* in this compelling book. Focusing on selected American artists, writers, composers and game designers, *Genesis II* explains how they have embraced or turned away from technology. An entire chapter is devoted to contemporary visual arts, and another segment covers the history and development of video games.

GAMES

TRIAD

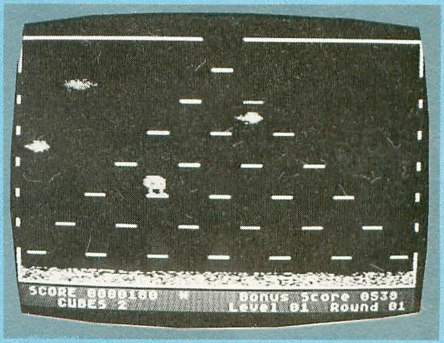
Adventure International
P.O. Box 3435
Longwood, FL 32750
(800) 327-7172
(305) 862-6917
48K—diskette
$34.95

You and a friend can battle the nine unique and deadly foes in this fast-paced shoot-em-up game. Joystick and keyboard controls move your player(s) in up to ten levels. Victories and defeats are tallied on a tic-tac-toe-like scoreboard.

SUBMARINE COMMANDER

Thorn EMI
1370 Ave. of the Americas
New York, NY 10019
(212) 977-8990
16K — cartridge
$44.95

Your mission is to destroy all enemy merchant shipping in the Mediterranean Sea. The sub is equipped with a map, sonar, periscope, and torpedos. You have a full instrument panel to help you evade the enemy's shells and depth charges, and to attack him undetected. Controls are: Surface, Dive, Rudder, and Neutralize Buoyancy.



MR. COOL

Sierra On-Line
36575 Mudge Ranch Road
Coarsegold, CA 93614
(209) 683-6858
8K — cartridge
$37.78

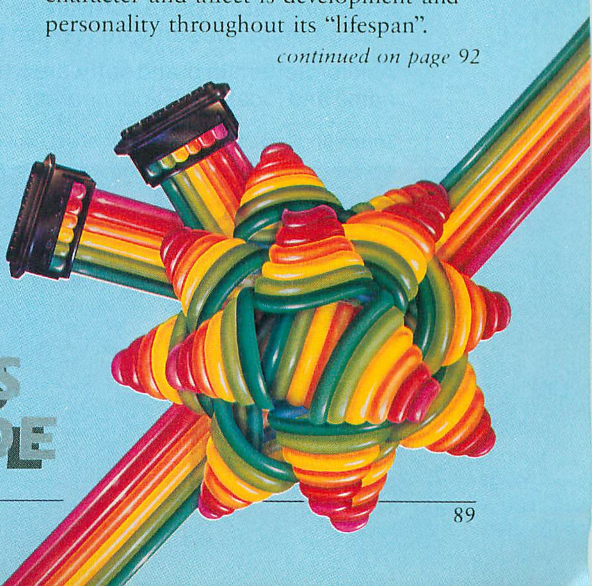
Watch this uppity ice-cube character — Mr. Cool — invade the pyro-pyramid and freeze out the Hot Springs and the Fireballs. His enemies constantly try to melt him and he has to act fast to avoid contact. The playfield simulates a furnace and you are the ice-cube in hostile territory.

LIFESPAN

(simulation game)
Roklan Corporation
3335 North Arlington Heights Road
Arlington Heights, IL 60004
(312) 392-2525
16K—cartridge
$44.95

This game is based on a unique concept in video games: you follow the birth of a character and affect is development and personality throughout its "lifespan".

continued on page 92



BUYER'S GUIDE



WE'RE VERY HARD ON OUR SOFTWARE

You might even say we're perfectionists. Because at Softsmith,™ we give our software the hardest workout, the toughest testing, the most rigorous evaluation. The result is software that has earned our confidence, and will justify your trust.

In particular, we do three things that make Softsmith software the most dependable you can buy.

1.

We're picky. Out of the hundreds of programs Softsmith evaluates every month, we choose to publish very few. A lot of good programs are rejected; but we think you can't be too picky when it comes to personal computer software. Our selectivity is your best assurance of quality.

2.

We complain a lot. If you were a programmer, and Softsmith accepted your program, you would have a right to be proud. But you shouldn't go on vacation yet. Because no matter how good that program may be, Softsmith evaluators will suggest some improvements; politely, but firmly. We may complain a lot, but people thank us later.

3.

We insist on plain English. After we've made the best program better, we're still not finished. Because we know that even the best program is no good if it's too hard to use. So we put a lot of time and effort into translating our instructions from computerese into plain English.

We publish software you can trust. Yes, we pick our programs carefully. And complain a lot to make them better. And insist on plain English instructions. The result is a library of personal computer software you can depend on. Even if you don't know a Pascal compiler from an emulation subroutine.

Softsmith has programs you can trust for all the most popular personal computers. Programs for Education, Home Management, Entertainment, Word Processing, Business, Communications and Programming. Ours is the largest library of quality software under one brand name.

So before you choose a software package for your computer, make sure someone's taken the time to be hard on it. Make sure it's Softsmith, the software you can trust.

Ask for Softsmith brand software wherever computers or software are sold. Or call us TOLL-FREE at **(800) 341-4000** for the name and location of your nearest dealer.

Softsmith Corp., 1431 Doolittle Dr., San Leandro, CA 94577. A company of The Software Guild.™

SOFTSMITH™

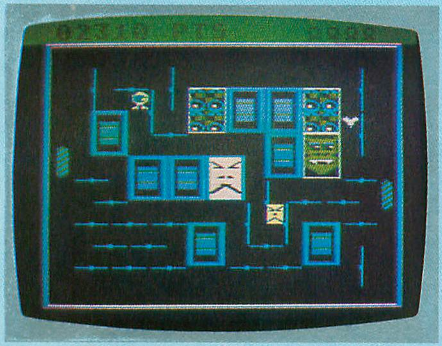
SOFTWARE LIBRARY

BUYER'S GUIDE

continued from page 89



Many life-like situations occur where the player must interact with others and often in humorous ways.



DRELBS

Synapse Software
5221 Central Ave.
Richmond, CA 94804
(415) 527-7751
16K — cassette
32K — diskette
$34.95

This isn't the first time a bunch of squares have nudged peaceful, wide-eyed creatures off their own turf. In this case, however, the hapless victims really *are* wide eyes (called Drelbs), while the four-cornered invaders are known as Trollaboars. When the drelbs become sick of being pushed around and hunted for kicks, they seduce the baddies to mid-town and stage a showdown on the atomic flip grid. Do the eyes have it?

INFIDEL

Infocom, Inc.
55 Wheeler St.
Cambridge, MA 02138
(617) 492-1031
48K — diskette
$49.95

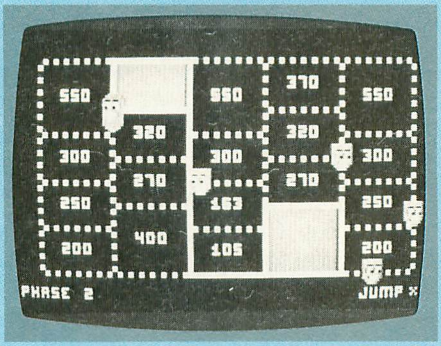
The first in the new Infocom "Tales of Adventure Series," this prose adventure challenges you to find the buried entrance to the last great pyramid. Written by the author of Suspended, the game also features INTERLOGIC, a system that enables you to use complete sentences instead of the standard two-word commands.

BRISTLES

First Star Software, Inc.
22 E. 41st St.
New York, NY 10017
32K
diskette or cassette — $29.95
cartridge — $39.95

NEW

Fernando Herrera, winner of the Atari Star Award for *My First Alphabet*, has created this action game in which players frantically paint rooms and dodge flying paint buckets. Players can choose to be one of eight characters (four of each gender), each of whom has his/her own theme music.



TIME RUNNER

Funsoft
28611 Canwood St.
Agoura, CA 91301
(213) 991-6540
16K — cassette and diskette
$29.95

Here is the first game in this company's Funarcade series for the Atari. You must rush to stake out as much space for yourself as possible before time runs out. Watch out for the defender-droids and the Hyperspace traps. You may choose COAST or DIRECT moves and BEGINNER or EXPERT modes.

NIGHT MISSION

Sublogic Software
713 Eaglebrook Rd.
Champaign, IL 61820
(217) 359-8482
32K — diskette
$29.95

NEW

Bombs away! This pinball game recalls the nostalgic days following WWII when pinball was the most vicious waste of time in town. Flashing bumpers, spinners, rollovers and targets simulate a classic battle for two players. Its careful design rewards flipper skill and discourages tilting. Activated by electronic "quarters."

WINGMAN

Microprose Software
1 Caribou Court
Parkton, MD 21120
(301) 357-4739
48K — cassette and diskette
$34.95

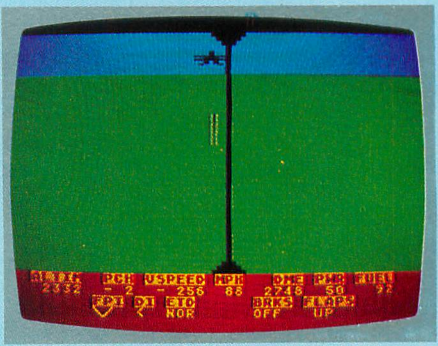
This aerial combat simulation for one to four players comes as close to real-life dogfighting as possible without risking life and limb. Programmer Sid Meier flew regularly with fighter pilots from the National Guard for three months before he wrote the program. The screen is divided into two independently scrolling horizontal displays. Your wingman protects you on raids.

SPACE KNIGHTS

Reston Publishing Co., Inc.
11480 Sunset Hills Rd.
Reston, VA 22090
(703) 437-8900
24K — diskette
$24.95

NEW

Roll over Isaac Asimov, and tell Roger Zelazny the news. Atari sound, graphics and color capabilities are combined here to create a series of stimulating sci-fi adventure games. A novel with illustrations is included in this packet.



FINAL FLIGHT

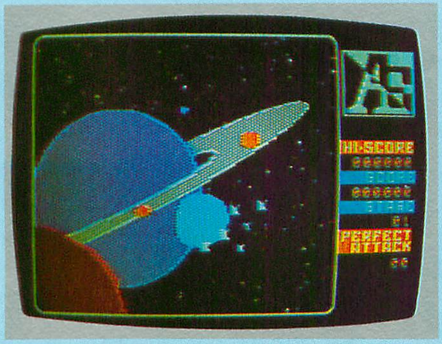
MMG Micro Software
P.O. Box 131
Marlboro, NJ 07746
(201) 431-3472
24K — cassette & diskette
$29.95

This is a real-time flight and landing simulator for a small plane similar to a Cessna. You're approaching the air strip, and must use your instruments and the view from your cockpit to land safely. You control pitch (angle to the ground), yaw (angle about the plane's vertical axis), and power with your joystick. You may choose flying conditions and decide whether or not to use your instruments.

GWENDOLYN

Artworx
150 North Main Street
Fairport, NY 14450
(716) 425-2833
40K—diskette
$27.95

Find and save the fair princess Gwendolyn in this colorful new graphics adventure by Marc Benioff. It features extensive graphics and sound (on both sides of the disk) and in your quest it takes you into a mysterious maze of tunnels.



A.E.

Broderbund Software
1938 Fourth St.
San Rafael, CA 94901
(415) 456-6424
48K — diskette
$34.95

The A.E. are coming! Beware! Squadrons of menacing sting rays are streaking down from the sky to attack you. You're doomed to be pestered forever unless you drive the A.E. away (A.E. is Japanese for "sting rays"). It's a fast-paced arcade game with eight levels of play that can be played with joystick or paddle.



CASTLE WOLFENSTEIN

Muse Software
347 N. Charles St.
Baltimore, MD 21201
(301) 659-7212
32K — diskette
$29.95

Atari owners can now play this popular and prize-winning game by Silas Warner. It is a sight-and-sound spectacular which requires quick responses and thinking to escape the Castle alive.

POO YAN

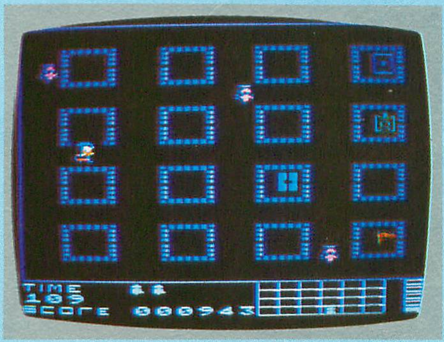
Datasoft, Inc.
9421 Winnetka Ave.
Chatsworth, CA 91311
(213) 701-5161
32K—diskette and cassette
(sold together in both media)
$34.95

An exciting new arcade game, Poo Yan (which means "piglet" in Japanese) combines color graphics with fast action. It requires quick reflexes and fast thinking as you battle a pack of vicious, hungry wolves to protect the helpless piglets roaming the forest.

CRISIS MOUNTAIN

Synergistic Software
830 North Riverside Dr., Suite 201
Renton, WA 98055
(800) 426-6505
40K — diskette
$34.95

Arcade game mirrors life, as terrorist plants nuclear bomb in active volcano. Players attempt to defuse it. Levels include such obstacles as boulders, lava, and a radioactive bat.



THE SPY STRIKES BACK

NEW

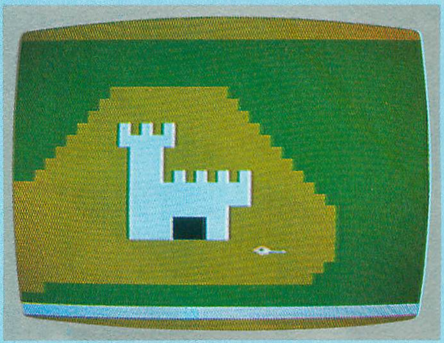
Penguin Software
830 4th Ave.
Geneva, IL 60134
(312) 232-1984
24K — cassette
32K — diskette
$19.95

Diabolical Dr. X has managed to blackmail the entire world with his threat to impose nuclear disaster upon a major international center. Meanwhile, an ex-spy named OOP is dragged out of his cushy administrative position, in order to stalk the 120 sections of the castle in which X is holed up. Even James Bond would be a little nervous.

TEMPLE OF APSHAI

EPYX/Automated Simulations
1043 Kiel Court
Sunnyvale, CA 94086
(408) 745-0700
32K — cassette & diskette
$39.95

A giant mantis, laying in wait in an insect god's temple, sounds like an escapee from a 1950's mutation movie. Unfortunately, this is the deadly challenge you face in this search for buried treasure. You create your own character via role-playing and must answer questions posed by the Dunjonmaster as you move along the dangerous path to riches.



GALAHAD AND THE HOLY GRAIL

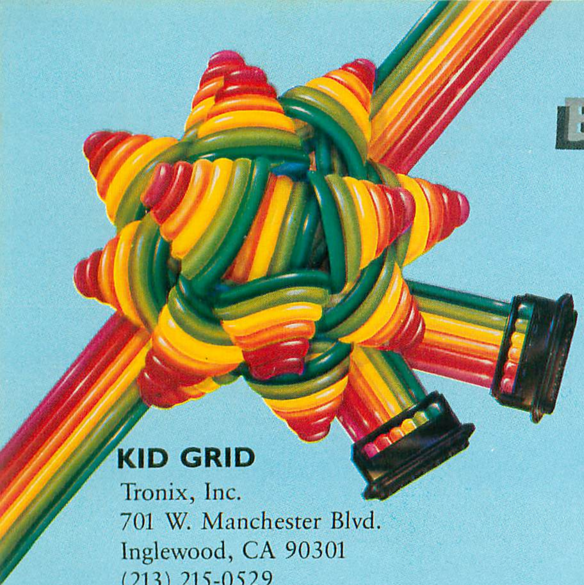
APX
Atari, Inc.
P.O. Box 3705
Santa Clara, CA 95055
(408) 727-5603
32K — diskette
$29.95
Add $2.50 for shipping & handling

For Sir Galahad, encountering dragons and giant spiders are all in a day's work as he plunges ahead in his quest for the Holy Grail. The 100 galleries through which he moves not only provide plenty of action, they also house the tools with which he can save his shining armor.

continued on next page



BUYER'S GUIDE



BUYER'S GUIDE

KID GRID
Tronix, Inc.
701 W. Manchester Blvd.
Inglewood, CA 90301
(213) 215-0529
16K — cassette and diskette
$29.95

One of the fastest video games, Kid Grid is designed specifically to take full advantage of the Atari's great graphics, sound and color capabilities.

The Kid darts around a grid, attempting to connect all the dots. In hot pursuit are four bullies — Squashface, Thuggy, Muggy and Moose — and if they catch the Kid, the results are explosive.

EDUCATIONAL

GALACTIC TRAVEL
Centurion Software
1714-B Marshall Court
Los Altos, CA 94022
(415) 965-9355
48K—diskette
$49.95

Take a star-hopping galaxy tour with this unique space travel simulation program. Students of astronomy and mathematics can learn about the stars and three-dimensional Cartesian (X,Y,Z) and polar coordinate systems while exploring the great beyond.

THE FACTORY: EXPLORATIONS IN PROBLEM SOLVING
Sunburst Communications
Room T 161
39 Washington Ave.
Pleasantville, NY 10570
(800) 431-1934
16K—diskette
$35.00

Test a machine, build a factory and yield a product while developing inductive reasoning skills and understanding of sequence, logic, and efficiency. Created for grades four through adult. Advanced color graphics and random generation of problems delight and challenge all ages.

THE PRESCHOOL LIBRARY
Program Design, Inc.
95 E. Putman Ave.
Greenwich, CT 06830
(203) 661-8799
16K—cassette
24K—diskette
$18.95 (each tape)
$23.95 (each disk)

Help a child from ages three to six develop listening skills; learn shape, letter and number recognition; and improve hand-eye coordination while having fun with these PDI Challengers. The Library includes Pre-School IQ Builders 1 and 2, Sammy the Sea Serpent and The Adventures of Oswald.

MUSIC MAJOR
Educational Software, Inc.
4565 Cherryvale Ave.
Soquel, CA 95073
(408) 476-4901
32K — cassette or diskette
$39.98

Fundamentals of music are taught in comprehensive lessons designed for all learning levels. Exercises also contain a teaching mode, and a quiz-master utility generates tests. Manual serves as study guide and reference book.

SAFETYLINE and STORYLINE
NEW
Maximus, Inc.
6723 Whittier Ave.
McLean, VA 22101
(800) 368-2152
48K — cassette only — $29.95 each
48K — cassette/disk — $34.95 each

Maximus calls these "software movies," for they incorporate color graphics, animation, lip-synched human voices and musical scores. Lessons in life are taught in both programs; Safetyline demonstrates child safety rules, while Storyline features fairy tales. Sold individually.

SUCCESS WITH MATH
CBS Software
#1 Fawcett Place
Greenwich, CT 06830
(203) 622-2670
cassette — $19.95 per program
diskette — $24.95 per program
16K — Add-subtract and multiply-divide programs
48K — Linear equation and quadratic equation programs

Teacher-created and classroom-tested, this series of four math programs allows students to learn and practice math and algebra concepts at their own pace. All problems are randomly generated and each must be completed before moving on.

APPLICATION PROGRAMS

CP/M ADD-ON MODULE
Atari, Inc.
$329.00

You've been waiting for this one. Now run CP/M, the world's largest base of business applications software, on your Atari system. The Z-80 microprocessor boasts 64K RAM, CP/M 2.2 Operating System and 80-column display capability. Business and professional users in particular will appreciate its compatibility with all Atari disk drives and computers.

ICS 800
Sierra Digital Research, Inc.
P.O. Box 50089
100 Washington St., Suite 104
Reno, NV 89513
(702) 323-3856
32K — cassette
40K — diskette
$135.00

A complete inventory program for the 800, it features price fields up to $100,000, and keeps track of 500 inventory items per disk. You can generate five different kinds of reports, including summary statistics, file contents, re-order reports, vendor lists and price lists. A sample data base is available for training purposes.

MILES ORDER/ENTRY INVOICING MODULE
Miles Computing
7136 Haskell Ave., #204
Van Nuys, CA 91406
(203) 994-6279
48K — diskette
$79.95

This package can be fully integrated with Atari's Bookkeeper program and automatically posts information to the Atari software. It is designed for the entry of sales orders and shipping data, and will print invoices, keep address records, and generate back-order reports.

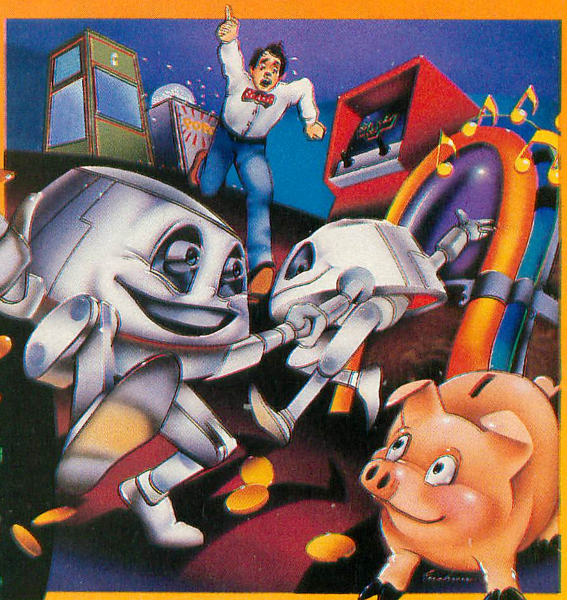
THE MONEY PROCESSOR
Luck Software
1160 Niblick Road
Paso Robles, CA 93446
48K — diskette
$80.00

Retire your pencil and calculator and

continued on page 96

A million laughs

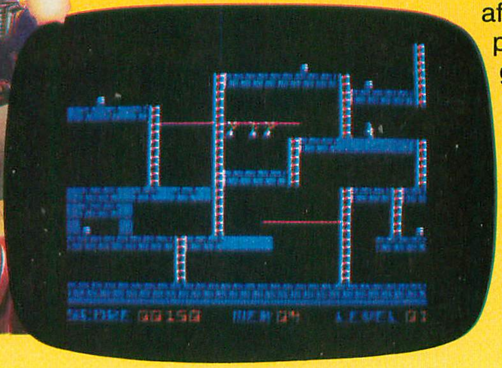
SPARE CHANGE™ You are the game-happy owner of the Spare Change Arcade. Two fun-loving, but overworked Zerks—the main characters in your most popular game—have broken loose and are trying to retire from the business. You try madly to stop them. If you can get a coin into the juke box, the Zerks get so caught up in the music, they drop everything and start dancing. You also try popping popcorn and making a pay phone ring—which immediately makes the Zerks stop, answer and start a wild conversation. If you "win" the game, there are rib tickling cartoons by the Zerks to reward your efforts. It's a game full of sight gags, surprises and comedy. From the best. Brøderbund! **For the Apple® II/II+/IIe, Atari® Computers, and Commodore 64™ in disk format.**





and an endless challenge





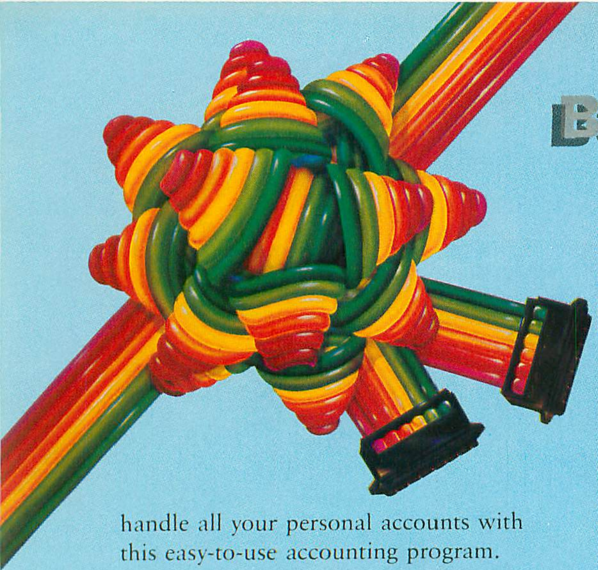
LODE RUNNER™ Here's a game that will never stop challenging you. That's because Lode Runner is more than a spellbinding, fast-action game with its 150 different mind-boggling game screens. Lode Runner is also an easy-to-use Game Generator that lets you create your own games. Without any knowledge of programming, you can easily design unique Lode Runnner screens, then bring them to action-packed life. You will maneuver through scene after scene, running, jumping, drilling passages and outfoxing enemy guards in a secret underground hide-away as you pick up chests of gold stolen from citizens of the Bungeling Empire. There's no end to the thrills, chills and challenge. Of course, it's from Brøderbund! **For the Apple® II/II+/IIe; Atari® Computers; Commodore 64™ (disk and cartridge); VIC-20™ (cartridge); IBM® PC.**

Ask your Brøderbund dealer for sneak previews.

Brøderbund Software **Discover the Difference**

17 Paul Drive San Rafael, CA 94903

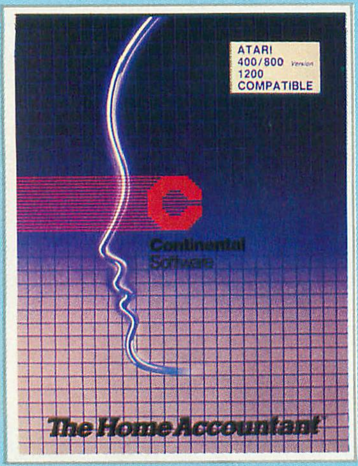
Apple II, II+, IIe are registered trademarks of Apple Computer, Inc. ATARI 400/800/1200, Commodore 64 and VIC-20 and IBM are trademarks of Atari, Inc., Commodore Electronics, Ltd., and International Business Machines Corporation, respectively.



BUYER'S GUIDE

continued from page 94

handle all your personal accounts with this easy-to-use accounting program.



THE HOME ACCOUNTANT
Continental Software
11223 South Hindry Avenue
Los Angeles, CA 90045
(203) 417-3003
(800) 421-3930 (orders)
48K — diskette
$74.95

This top-selling financial management system is now available for the Atari computers. It can perform a variety of accounting functions — from balancing several checkbooks to monitoring cash flow, checks, credit cards, assets, liabilities, income and expenses, as well as printing statements.

STOCK UTILITY
Janpro Products
P.O. Box 1028
Ontario, CA 91762
(714) 983-3817
16K — cassette
24K — diskette
$19.95

This program plots stock prices or other values entered into a vertical line chart. You can make hard copies of a stock at regular intervals (weekly, monthly) and can tape them side by side to form an endless chart — useful in tracking a stock. It has a chart range of 11.5 points or $11.50 with ½ point (50¢) increments.

DATABASE PROGRAMS

HOME FILING MANAGER
Atari, Inc.
P.O. Box 427
Sunnyvale, CA 94086
(408) 942-1900
$49.95

Automate your card-file records with this easy-to-implement program. The Home Filing Manager requires only 16K memory, and has a capacity for 18 fields and 38-character field-size. Because of its simplicity, this system is well-suited for handling index-card information that is searchable on any field. Do your input editing and updating with ease.



FILE FAX
TMQ Software, Inc.
82 Fox Hill Dr.
Buffalo Grove, IL 60090
(312) 520-4440
$129.00

When your applications require you to store hefty quantities of records, enlist File Fax as your ally. This database system holds records by the thousands in a maximum of 31 fields, and provides 40-character field size and 800-character record size. A helpful manual is included.

DATA PERFECT
LJK Enterprises, Inc.
P.O. Box 10827
St. Louis, MO 63129
(314) 846-6124

Looking for a database program that's flexible yet easy to use? Find it in Data Perfect's appealing report features, change capability and computed fields. With its record size of 511 characters and 32-field capacity, you can enter sizeable quantities of data in Data Perfect and merge them into Letter Perfect.

CCA DATABASE-MANAGEMENT SYSTEM
Custom Electronics, Inc.
238 Exchange Street
Chicopee, MA 01013
(413) 592-4761
$99.50

For the record — here's a full-scale data base management system capable of storing 249-character records with as many as 24 fields. Fields can contain 110 characters. Helpful prompts assist the user, and CCA allows system modification. Supports Percom double-density mode.

SYN-FILE+
Synapse Software
5221 Central Ave.
Richmond, CA 94804
(415) 527-7751
48K — diskette
$99.95

NEW

Successor to the popular FileManager database programs, Syn-File+ improves on them in capacity (66 fields per record, 16 disks per file), and flexibility — you can search across drives if necessary. You can also load your old data files from other programs without rekeying. Other Syn- programs include Syn-Trend, Syn-Calc, Syn-Comm and Syn-Tax.

WORD PROCESSORS

ATARIWRITER
Atari, Inc.
1265 Borregas Ave.
Sunnyvale, CA 94086
(408) 942-1900

AtariWriter is a simple, yet sophisticated word processor that improves in many ways upon the previous Atari mainline product. AtariWriter is document oriented, rather than page oriented, and has many features. Editing is easy and accidental text loss is well protected against. With some printers, special print styles can be invoked. In addition, files that have been written with most other word processors can be loaded onto AtariWriter, then edited as desired.

BANK STREET WRITER
Broderbund Software
1938 Fourth Street
San Rafael, CA 94901
(415) 456-6424
48K — diskette
$69.95

The first truly home-oriented word

processing system, Bank Street Writer has been heavily tested among students and young adults, and is designed for the whole family. Every function and command is fully and clearly prompted on screen. Many powerful features are included. Bank Street Writer requires a disk drive and 48K RAM, and comes with a special tutorial.

LETTER PERFECT

LJK Enterprises, Inc.
7852 Big Bend Blvd.
St. Louis, MO 63119
(314) 962-1855
16K — cartridge or diskette
$99.00

Letter Perfect is a character-oriented word processor with many powerful features. It is the only one that works with the 80-column boards, an advantage. It can merge data from LJK's Data Perfect database program, and can use the Spell Perfect spelling checker (both sold separately).

SPELL PERFECT

LJK Enterprises, Inc.
7852 Big Bend Blvd.
St. Louis, MO 63119
(314) 962-1855
16K — cartridge or diskette
$79.00

Users of Letter Perfect word processor will appreciate this companion program. It checks all of the words used in a text file against its dictionary and will make corrections as ordered. Has "sounds-like" feature, and dictionary is expandable. Program also gives count of words in document.

THE ALOG PAGEWRITER

Alog Computing
1040 Veronica Springs Road
Santa Barbara, CA 93105
(805) 964-4660
32K—diskette
80 column printer, 850 interface
$39.95

A simple word processor, this program turns your Atari into an electronic typewriter. The entire page layout is displayed while you type and edit. In just five minutes you can begin using it to write letters, memos or term papers. Features a help screen with command summary.

GRAPHICS

LIGHT PEN

Atari, Inc.
$99.95

Drawing on the television screen is no longer limited to industrious toddlers — all age groups will enjoy testing Atari graphics capabilities with this space-age quill. Simple to use, it plugs into Port 1, and is activated by pressing the tip against the CRT surface. Graphic Works software is a bonus.

VISUAL SYNTHESIZER

QuinTech Systems, Inc.
1271 W. Dundee Rd., Suite #44B
Buffalo Grove, IL 60090
1-800-621-0660, outside Illinois
1-800-572-0440, in Illinois
48K — diskette
NEW
$34.95
add $3.00 for shipping and handling

Creating your own dynamic computer art is easily accomplished through the use of menu selections. These productions are not static pictures, but a continuous flow of ever-changing designs that can be saved on disk for later playback. Interactive functions provided during playback include tempo control, color effects, and screen scrolling.

MOVIEMAKER

Reston Publishing Co.
11480 Sunset Hills Rd.
Reston, VA 22090
(703) 437-8900
16K — cartridge
$60.00

Anyone can become a director with this innovative new tool. You devise the action, set the scene, create the actors and play back the computer "movie." Use your imagination and your Atari to make professional-looking animation.

FUN WITH ART

EPYX/Automated Simulations
1043 Kiel Court
Sunnyvale, CA 94089
(408) 745-0700
32K — cartridge
$39.95

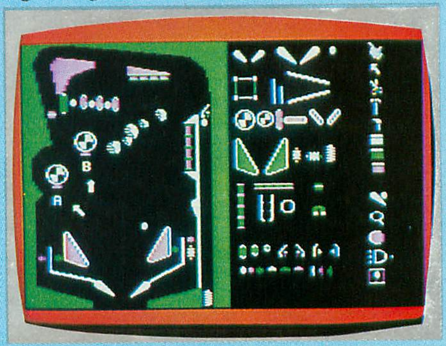
Express yourself artistically with computerized brush and palette. Fun With Art offers a choice of 24 design modes to delight users at all levels of artistic skill and computer experience. Fill your video screen with your renderings in eight shades of each of sixteen colors, for a total of 128 color variations. Insert the cartridge in your Atari 400, 800 or 1200, and use it with your joystick. Incorporate pictures you create in your BASIC program.

UTILITIES

MONKEY WRENCH II

Eastern House Software
3239 Linda Drive
Winston-Salem, NC 27106
(919) 924-2889
$59.95

ROM cartridge that plugs into the right-hand slot of the 800 to augment Atari BASIC. It provides a total of 18 BASIC commands and 16 machine language commands. These commands include automatic line numbering, hex and decimal conversion, finding and exchanging strings and scrolling up and down.



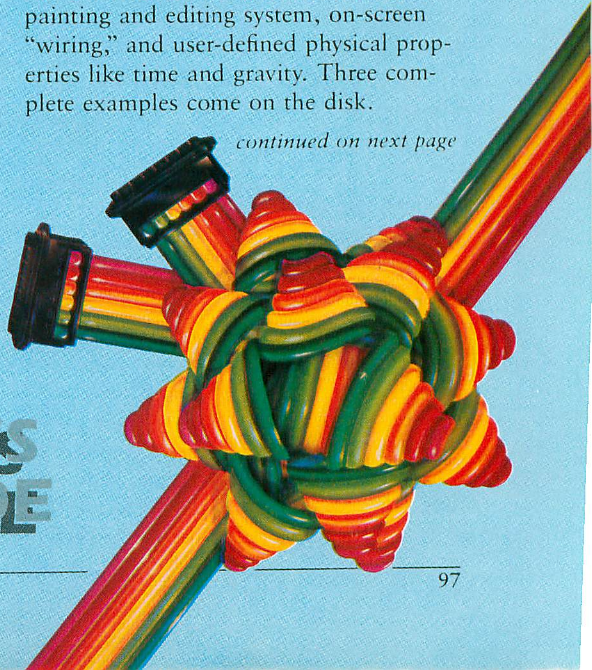
PINBALL CONSTRUCTION SET

by Bill Budge
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171
48K — diskette
$39.95

Computerized erector set allows you to design and play your own pinball games, built from a library of pinball-machine parts. These include bumpers, balls, flippers, targets, and more. Construction is accomplished with joystick.

Options include a sophisticated graphics painting and editing system, on-screen "wiring," and user-defined physical properties like time and gravity. Three complete examples come on the disk.

continued on next page



BUYER'S GUIDE



BUYER'S GUIDE

DISKED

Amulet Enterprises
P.O. Box 25612
Garfield Heights, OH 44125
(216) 475-7766
24K — diskette
$89.95

These utility programs can view and edit the contents of any sector in hex, decimal or character (ATASCII or screen code). Also disassembles programs into 6502 mnemonics using virtual addressing. You can recover deleted files, map used and crashed sectors, copy any sector or block of sectors, and move cassette files onto disk or back to cassette.

ULTRA DISASSEMBLER

Adventure International
P.O. Box 3435
Longwood, FL 32750
(800) 372-7172
(305) 862-6917
$49.95

The second program in its Ultra Utility series, AI has just released this sophisticated labelling disassembler which closely re-creates the source code from which a machine language program was assembled. It reads code in from memory, but it also disassembles DOS files and even code from a list of specified disk sectors. Source code may be edited and reassembled with other popular Atari assemblers.

DISKWIZ

Allen Macroware
P.O. Box 2205
1906 Carnegie #E
Redondo Beach, CA 90278
(213) 376-4105
16K — diskette
One or two disk drives

Provides disk editing, repair and duplication for Atari and Percom drives. Repairs DOS and non-DOS sectors with on-screen Hex/ASCII editing. Will print all modes to any printer and inverse and special graphics characters to Epson with Graftrax and NEC 8023A printers. Has an onboard disassembler and a complete manual.

OTHER

1010 PROGRAM RECORDER

Atari, Inc.
$99.95

The least-expensive mass storage technique is to use standard audio cassettes. With the Atari you will need a special Program Recorder; this is the most recent. Though somewhat improved in reliability, the essential technology of the recorder remains as before. One track is used for data, while the other is available for sound at the discretion of the user. Two I/O connectors permit placement anywhere in the system chain.

ATARI NUMERICAL KEYPAD

Atari, Inc.
$124.95

Now number entry is made easy! Here's a keypad that accommodates you when you're working with large amounts of numerical data. This 17-key numerical keypad comes with program diskette, and works with The Bookkeeper, VisiCalc. For added versatility, you can redefine key functions.

HEADMASTER

(media head and video screen cleaners)
SSK Enterprises, Inc.
2488 Townsgate Road
Westlake Village, CA 91361
(213) 889-1831

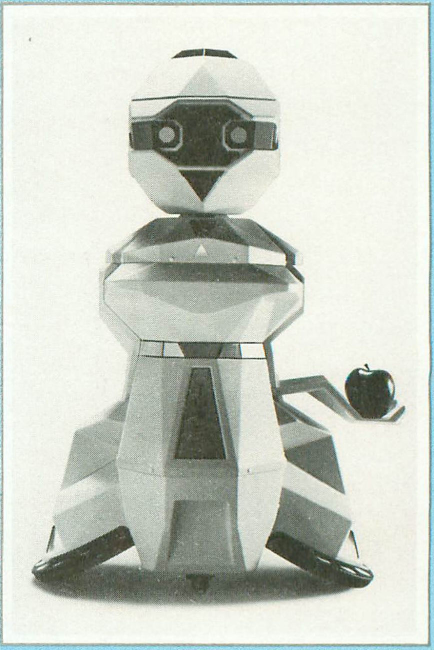
Dissolve and remove contaminants from your disk drive and cassette player heads with the non-abrasive cleaner in this complete line of cleaners and accessories for microcomputers. The Aerosol Anti-Static Treatment reduces damages caused by static electricity for up to two months with one treatment. The Screen Cleaner cleans and protects your VDT from static dust build-up and prevents yellowing of the plastic coating.

THE CRITICAL CONNECTION

(CP/M interface)
USS Enterprises
6708 Landerwood Lane
San Jose, CA 95120
(408) 997-0264
$175.00

NEW

In our October issue, we made an error in our description of this product. If one has a CP/M system, Critical Connection makes it possible to use an Atari computer and Atari software with the CP/M peripherals. Also, the price is $175.00, not $75.00 as we printed.



TOPO

(robot)
Androbot, Inc.
101 E. Daggett
San Jose, CA 95134
(408) BOB-TOPO
$795.00

NEW

Former *Jetsons* cartoon fans have been waiting for this since 1963. Topo, a 36.5″ × 24″ plastic and metal robot, moves, speaks, and interfaces with most computers via a remote infrared communications link. He (she?) can be controlled with either joystick or keyboard. TopoForth software package is included, thus enabling users to write original programs for the compliant creature. Battery operated.

VISICALC PROGRAMMING: NO EXPERIENCE NECESSARY

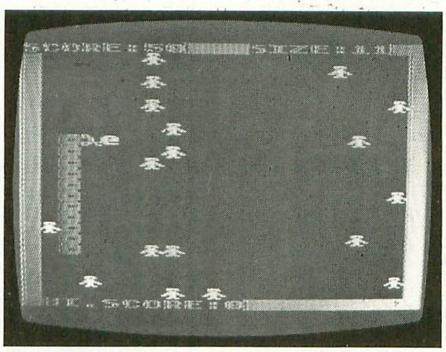
(instructional package)
Little, Brown and Co.
Order Dept.
200 West St.
Waltham, MA 02154
(617) 277-0730
48K — diskette
$59.95

NEW

Three to eight hours is all the time required to master VisiCalc, via this disk-and-guide aide. Divided into three lessons, it takes the user from beginning to advanced functions, and is the only tutorial that interacts directly with booted VisiCalc.

WORM SQUIRM

by JOHN GUNTHER



Today, you're going to take your worm out for a squirm around the block.

Your hungry little worm has a lot of tempting goodies to strive for in this game of skill. Your mission is to direct it to the tasty bugs. Don't let it run into the walls or into its own tail, or turn back on its own neck; if you do, its eating days are over! Survive this stage of the game, and you will find more challenges ahead of you. Small castles appear on the screen for your worm to attack. However, if you don't get to them fast enough, they turn into impervious stone obstacles.

There is more to Worm Squirm than meets the eye. Not only is it fun, but it's also a tutorial in writing a fast program in BASIC. After you've played with it for a while, I think you'll be amazed to discover that there is not a single line of machine language in the program. BASIC is not necessarily a slow language.

One simple technique I used in the program is a test for the absence of obstacles in the worm's path (i.e., "if there is nothing in the way, then continue"). See line 115 in the program. I used the statement "IF NOT PEEK(PPOS) THEN 150," where PPOS is the next location in the worm's way. Many programs check to see if the next location involves any one of a number of possible obstacles, but this often requires checking for three or four different items, which takes time.

IF NOT PEEK, on the other hand, is one of the fastest tests there is in BASIC. It jumps over the rest of the tests if the path is clear, and uses a PEEK, which is also very fast. PEEKs and POKEs to the screen were also used for fast movement.

I put the main loop and the most-used subroutines toward the beginning of the program. When BASIC looks for lines and subroutines, it starts at the beginning; therefore, it's to your advantage if BASIC can find them as soon as possible.

The use of variable GOSUB's (see line 150) allows the program to be more flexible, especially when different levels of play are used (since they use different numbers of variables).

The real heart of the program, however, is the dual character set. What you see as animation, when the worm's body changes and the bugs quiver, is actually two different character sets being alternated on the screen. Some of this switching is done in lines 115 and 170. But while the worm is eating, the switch is performed in lines 2010 and 2055. Location 756 (in memory) holds the "page number" of the character set. This location is POKEd with either SET or SET + 2. New character sets are defined in lines 5020 through 5054.

The game displays the highest score achieved in a session of play, and also shows the names and scores of the top five players at the end of each game. This routine would probably be useful in a number of games. You can find it in lines 8050 through 8610, if you'd like to add it to one of your own games. To do this, you'll also have to define the strings, as was done in lines 4000 through 4004.

There are ten skill levels to choose from in Worm Squirm: Level 1 is the most difficult. If you have small children who need an easier game (or if your reflexes aren't what they used to be), you can input any higher number you like. The higher the number, the easier the game.

When your conquering worm is young, it is fairly easy to maneuver. As it gets older, though, having eaten more bugs, it gets much longer and the chance of it running into its own tail (and thus being terminated) increases dramatically. As a result, it's necessary to develop a strategy to keep the tail out of your way if you want to survive and prosper.

At the start of the game, you are provided with nineteen red bugs; these are worth ten points each. A green bug appears at random intervals, but disappears if not eaten quickly. This one is worth fifty points.

If you live to be a big worm, you are rewarded with a higher level of existence to explore. Here, you find castles waiting to be terrorized. If you don't get to them fast enough, however, they turn into solid fortresses that block your path. As a warning signal, the fortresses grow darker as they solidify. So be forewarned.

continued on next page

```
5 REM ...WORM SQUIRM...
7 REM ...by John Gunther...
9 REM ANTIC MAGAZINE
10 GOTO 4000
20 R1=SCREEN+INT(480*RND(0)):IF PEEK(R
1)=0 THEN POKE R1,GBUG:EXT=LT+SZ:RA=30
:RETURN
21 GOTO 20
30 POKE R1,0:RA=20:EXT=LT+15:RETURN
100 IF STICK(0)=15 THEN 100
105 FOR V=0 TO DIF:NEXT V:ST=STICK(0):
DX=(ST=7)-(ST=11):DY=(ST=13)-(ST=14):I
F ST=15 OR DX+DY=0 THEN 115
110 XD=DX:YD=DY:TS=ST
115 POKE 756,SET:TX=PX+XD:TY=PY+YD:PPO
S=SCREEN+TX+20*TY:IF  NOT PEEK(PPOS) T
HEN 150
135 SEE=PEEK(PPOS):IF SEE=RBUG THEN 20
00
140 IF SEE=GBUG THEN 2005
145 IF SEE<=BOD THEN 1000
148 IF SEE=CASTLE THEN FIX=15:RA=3000:
EXT=LT+15
150 LT=LT+1:IF LT>EXT THEN GOSUB RA
155 L(LT)=PX+20*PY:POKE SCREEN+L(LT),
BOD
160 IF LT>SZ THEN POKE SCREEN+L(LT-SZ)
,0
165 POKE PPOS,CHR(TS):PX=TX:PY=TY
170 POKE 756,SET+2:GOTO 105
200 GRAPHICS 1+16:POKE 756,CHSET/256:G
OSUB 9000
240 XD=0:YD=0:RBUG=193:BOD=70:EXT=20:G
BUG=75
260 SETCOLOR 1,12,4:LT=0
270 FIX=15:B=7:FOR I=0 TO 19:POKE SCRE
EN+I,B
280 POKE SCREEN+460+I,B:NEXT I
290 FOR I=1 TO 23:POKE SCREEN+I*20,B:P
OKE SCREEN+19+I*20,B:NEXT I
300 POSITION 0,0:? #6;"SCORE:";SC:POSI
TION 11,0:? #6;"SIZE:";SZ:POSITION 1,2
3:? #6;"HI.SCORE:";HS
390 FOR I=0 TO 18
395 R=SCREEN+INT(480*RND(0)):IF PEEK(R
)=0 THEN POKE R,RBUG:NEXT I:GOTO 410
400 GOTO 395
410 PX=10:PY=11:POKE SCREEN+PX+20*PY,C
HR(14)
430 DX=1:DY=1:GOTO 100
1000 POKE PPOS,CHR(TS)+192:POKE SCREEN
+PX+20*PY,BOD+128:FOR FF=0 TO 1000:NEX
T FF
1005 IF SC>HS THEN HS=SC
1010 GOTO 8050
2000 A1=218:A2=224:A3=RBUG:SC=SC+10:GO
TO 2010
2005 RA=20:SC=SC+50:A1=90:A2=96:A3=GBU
G
2010 FOR I=A1 TO A2 STEP 0.2:POKE 756,
SET:POKE PPOS,A3
2050 SOUND 0,2*(I-A1),12,14
2055 POKE PPOS,I:POKE 756,SET+2:NEXT I
2070 SZ=SZ+1:SOUND 0,0,0,0
2080 POSITION 6,0:? #6;SC:POSITION 16,
0:? #6;SZ:GOTO 150
3000 BRICK=INT(RND(0)*22)
3010 BRICK=SCREEN+25+BRICK*20:IF  NOT
PEEK(BRICK) THEN FIX=15:POKE BRICK,CAS
TLE:RA=3050
3020 RETURN
3050 IF FIX=0 THEN FIX=15:POKE BRICK,B
:RA=3000:EXT=LT+20:RETURN
3060 FIX=FIX-0.2:SETCOLOR 2,9,FIX:RETU
RN
4000 DIM SK(6),NAME$(75),SCORER$(10):S
Z=10:RA=20:CHROM=57344
4002 NAME$="

 ":REM 66 SPACES
4003 DIM BLANK$(12):BLANK$="
 ":REM 12 SPACES
4004 FOR N=0 TO 6:SK(N)=0:NEXT N
4006 DIM CHR(15),L(500):CHR(14)=2:CHR(
13)=3:CHR(11)=4:CHR(7)=5:CASTLE=136
4008 SET=(PEEK(106)-4):CHSET=SET*256:
POKE 106,PEEK(106)-5
4010 GRAPHICS 1:GOSUB 9000
4020 POSITION 2,3:? #6;" YOU are A wor
m AS YOU eat YOU GET   LONGER AND LONG
ER  SCORING MORE POINTS"
4025 POSITION 2,8:? #6;" but..."
4026 POSITION 1,10:? #6;"YOUR existenc
e is    terminated if you..RUN INTO YOU
R BODY, TURN BACK ON YOUR-  SELF"
4027 POSITION 1,15:? #6;"OR RUN INTO A
 WALL"
5000 FOR M=0 TO 511:CAROM=CHROM+M:POKE
 CHSET+M,PEEK(CAROM):POKE CHSET+512+M,
PEEK(CAROM):POKE 709,M/3:NEXT M
5002 READ A:IF A<0 THEN GOSUB 10000:GO
TO 200
5003 FOR J=0 TO 7:READ B:POKE CHSET+A*
8+J,B:NEXT J
5004 READ A
5006 FOR J=0 TO 7:READ B:POKE CHSET+A*
8+J+512,B:NEXT J
5010 GOTO 5002
5020 DATA 1,195,36,24,60,90,153,24,36
5022 DATA 1,60,36,24,60,90,153,24,36
5024 DATA 2,5,2,6,60,102,231,165,231
5026 DATA 2,160,64,96,60,102,231,165,2
31
5028 DATA 3,231,165,231,102,60,6,2,5
5030 DATA 3,231,165,231,102,60,96,64,1
60
5032 DATA 4,135,109,191,16,16,31,13,7
5034 DATA 4,7,13,31,16,16,191,109,135
5036 DATA 5,225,182,253,8,8,248,176,22
4
```

continued on page 102

THE GREATEST ATARI® GAME OF ALL TIME.

Object: Capture more programs than from any other source.
Score: The best prices for programs win.

Actually, every member of CompuClub is a winner, because no one pays lower prices for Atari® programs than our members.

And no other source offers as many programs, with a descriptive catalog covering every piece of software we offer!

CompuClub has hundreds of Atari® programs: games, education and business. It's an astonishing selection, but just as incredible are our prices and our catalog.

Prices always at least 25% below retail

Fact is, usually our prices on selected programs are even lower than that. And we're always running sales with savings of at least 50% from the list price on some of your favorite programs.

And there are several ways to pay: MasterCard, Visa, or the ever popular check or money order.

Annotated catalog, updated every 45 days

We don't like to knock the competition, even by implication, but there are definite advantages to a CompuClub membership. One of the best of them is our catalog, which not only offers an unbelievable number of programs, but includes a description of each and every one of them.

In fact, the catalog is so big and filled with so much information that we print a separate price list. And we keep adding so many programs that we have to update the catalog nine times a year during the course of your membership.

Think of it! No more wondering what's behind the fancy label, no more shooting in the dark or depending on the word of a clerk who may not be familiar with the program you're interested in.

Exclusivity for Atari® owners

We're not trying to be all things to all people. We are definitely the best thing since the floppy disk for Atari® owners, and only Atari® owners. CompuClub is very exclusive.

Our catalog is thick with hundreds of Atari® programs, and only Atari® programs. No more fumbling your way through thickets of strange symbols and codes for the different computers everybody else's catalogs try to cover.

The rules

The rules are simple. To play the CompuClub "game," you've got to be a member. Anyone can join, as long as they fork over a mere five bucks, and agree to buy three programs during the year of membership. Order and buy your programs at any time during the year, but we're sure with our selection and prices that you'll want to get going right away.

Five dollars buys you a one-year membership, exclusive Atari® program offerings, a fully annotated catalog with 9 updates during the year, a current price list (and any necessary updates), a subscription to our newsletter, and discounted prices at all times, including announcements of our periodic sales, which feature savings of 50% off and more.

You can join by filling out the coupon below, or get an instant membership by calling our toll-free number and giving us your MasterCard or Visa identifying number. We'll forward your registration and sales order materials, your catalog and price list, so you can begin ordering right away.

That's all there is to it.

If you think you play a good game, you've got to join CompuClub. It's easy to play, and it saves you money.

We think it's the best Atari® game going, because with us, everybody wins.

CompuClub
Where Atari owners belong.





YES, **CompuClub,** PO Box 652, Natick MA 01760 **ATTN: Dept. AT**

I want to play the greatest Atari® game of all. Please enroll me in CompuClub for one year, and rush my registration material, catalog and price list to me. I agree to buy any three programs during the course of my year of membership. I have enclosed my payment of $5, or authorization to bill my charge card account.

Please make your check payable to CompuClub
Payment enclosed ☐ check ☐ money order.
Bill my ☐ MasterCard ☐ Visa ID #________________

Expires________________

Signature________________

Name________________

Address________________

City________ State________ Zip________

Computer Model________________ Disk ☐ Tape ☐

If you are not satisfied in any way with the conditions of your membership, you may cancel before ordering any programs from CompuClub. Your membership fee of $5 will be cheerfully refunded.

To join by phone, call toll-free.

800-631-3111

Please have your MasterCard or Visa card ready when you call. In Massachusetts, call 1-617-879-5232. We will forward your membership materials after confirming authorization for your charge.

WORM SQUIRM *continued from page 100*

```
5038 DATA 5,224,176,248,8,8,253,182,22
5
5040 DATA 6,126,255,255,255,255,255,25
5,126
5042 DATA 6,126,255,255,231,231,255,25
5,126
5044 DATA 7,255,255,255,255,255,255,25
5,255
5046 DATA 7,255,255,255,255,255,255,25
5,255
5048 DATA 11,153,165,102,24,231,36,102
,153
5050 DATA 11,153,189,126,24,255,60,126
,153
5052 DATA 8,14,142,200,235,235,191,229
,231
5054 DATA 8,56,184,200,235,235,191,253
,255
5200 DATA -1
8050 GRAPHICS 0:SETCOLOR 1,0,0:SETCOLO
R 4,8,0:SETCOLOR 2,0,7:IF SC<SK(5) THE
N 8600
8055 ? " PLEASE ENTER YOUR NAME";:INPU
T SCORER$
8060 LN=LEN(SCORER$):IF LN<10 THEN SCO
RER$(LN+1)=BLANK$(1,10-LN)
8100 FOR N=1 TO 5:IF SC>=SK(N) THEN 84
00
8150 NEXT N
8200 GOTO 8600
8400 M1=51:M2=60
8500 FOR N1=5 TO N STEP -1:SK(N1+1)=SK
(N1)
8510 NAME$(M1+10,M2+10)=NAME$(M1,M2)
8515 M1=M1-10:M2=M2-10
8520 NEXT N1:SK(N)=SC:NAME$(M1+10,M2+1
0)=NAME$(M1,M2):NAME$(M1,M2)=SCORER$
8600 ? ,"HIGH SCORERS":? :? :? ,"PLAYE
R          SCORE":?
8610 M3=1:M4=10:FOR SS=1 TO 5:? ,NAME$
(M3,M4),SK(SS):M3=M3+10:M4=M4+10:? :NE
XT SS
8615 GOSUB 10000:SC=0:SZ=10:RA=20:GOTO
 200
9000 SCREEN=PEEK(88)+256*PEEK(89):RETU
RN
10000 TRAP 10000:? "DIFFICULTY (1-10 1
=HARD)";:INPUT DIF:DIF=DIF*2:TRAP 1010
0:RETURN
10100 POSITION 2,14:? #6;"CONGRATULATI
ONS":POSITION 1,15:? #6;"YOU HAVE COMP
LETED"
10105 POSITION 3,16:? #6;"THIS LEVEL !
!":FOR T=0 TO 1000:NEXT T:RA=3000:TRAP
 10100:GOTO 200
```

TYPO TABLE

Variable checksum = 1952678

Line num range			Code	Length
5	–	135	FY	483
140	–	270	UO	448
280	–	1010	SP	506
2000	–	3050	PM	517
3060	–	4010	SZ	507
4020	–	5004	RK	503
5006	–	5038	CC	407
5040	–	8060	AC	526
8100	–	9000	FZ	514
10000	–	10105	FU	278

PROGRAM DESCRIPTION

LINE NUMBERS DESCRIPTION

20– 30	Green bug subroutine
100	Wait for player to start
105– 170	Main loop: Read stick, move WORM, check for edibles
200– 430	Variable intialization and screen drawing: fill with red bugs
1000– 1010	WORM's demise
2000– 2080	Eat bugs
3000– 3060	Castle subroutine
4000– 4008	One-time variable initialization
4010– 4027	Instructions
5000– 5200	Alternate two character sets; redefine characters
8050– 8610	Names and scores input
9000	Screen location subroutine
10000	Difficulty level input
10100–10105	Level completion subroutine

CHANGEABLE PARAMETERS

EXT: Length of time the green bug is on the screen; it's related to the length of the WORM (EXT = LT + SZ where LT is the current position and SZ is the WORM length)

L(500): In line 4006, this array stores the locations of the WORM's body. Increase the array length and you will increase the time at a level. I use TRAPs to abort each level and reset L(LT).

SZ: In line 2070, SZ = SZ + 1 everytime the WORM eats, it gains one body segment. Change it to SZ = SZ + 2 and the WORM will grow faster.

JACKPOT

by BILL MARQUARDT



Jackpot! is a realistic simulation of a Las Vegas slot machine. Play is not complicated — you simply load the game, insert a joystick into Port 1, and wait for the slot machine to appear on your screen. Next, you will see a dime move from a stack of coins on the right side of the screen up to the machine's coin slot. At this point, or at any time during play, you have four options to choose from:

(1) Press the fire button one, two or three times, and pull down on the joystick; this starts normal play.

Each press of the fire button inserts one dime into the slot machine. The first dime plays the center row; the second plays the top row; and the third plays the bottom row. For each dime you play, the progressive jackpot (which is displayed at the top of the screen) increases by four cents. Any minor jackpots are indicated at the left of the screen. Also displayed on the left, in whole dollar amounts, are running totals of the money played and won.

(2) Press the joystick forward before putting any dimes into the slot. This shows you exactly how much money has been played, how much has been won, and the percentage of return. Press [START] to return to the game.

(3) Press [SELECT] before inserting any dimes. This option displays a chart that shows the possible winning combinations and their respective payoffs. Press [START] to return to the game.

(4) (Disk users only!) Press [OPTION] before inserting any dimes. This action quits the game and saves the progressive-jackpot amount to a disk file named JACKPOT.DAT. Cassette users can't take advantage of this feature, but otherwise the game's cassette version is virtually identical to the disk version. If you are using a cassette, do not include lines 1399 to 1405, 3119 to 3121, or 14999 to 15030.

The primary programming techniques used to write this program include simple string manipulations and the creation of a new character set. POKEs and PEEKs were limited to those areas that have no equivalent in Atari BASIC. This program should list completely on any printer without any "missing" graphics or control characters. I should point out to new programmers, however, that when you're using the text modes (Graphics 1, 2, 17 and 18), statements such as COLOR 32:PLOT 15,4 are equivalent to POSITION 15,4: PRINT #6;CHR$(32).

The odds on this machine can be altered by changing the appropriate characters in the strings defined in lines 1070, 1080 and 1090. The last two characters should always be identical to the first two — this accounts for the wrap-around of the "wheels." Ambitious programmers may want to change the program for Jackpot! so they can also play diagonal combinations, or so the total amounts played and won can also be stored on disk data files.

At any rate, this is the rare slot machine that you can afford to play as long as you like. Keep trying for three diamonds and the Super Jackpot. Good luck!

Bill Marquardt is an electronics technician for the U.S. Postal Service, a former field service representative for Del Mar Avionics, and a graduate of the Control Data Institute. He programs in both BASIC and Pascal.

```
1Ø REM ***** PROGRESSIVE JACKPOT ****
2Ø REM *** ANTIC MAGAZINE   ****
997 REM
998 REM ******* INITIALIZATION ******
999 REM
1ØØØ GRAPHICS 18
1Ø1Ø POSITION Ø,Ø:? #6;"progressive ja
ckpot!"
1Ø2Ø POSITION 9,2:? #6;"BY"
```

continued on next page

```
1030 POSITION 3,3:? #6;"BILL MARQUARDT
"
1040 POSITION 3,10:? #6;"PLEASE STAND
BY"
1050 DIM WHEEL1$(32),WHEEL2$(32),WHEEL
3$(32),LINE1$(3),LINE2$(3),LINE3$(3)
1055 DIM WIN$(4),CHECK$(3),PAYOFF$(10)
,TEN$(3),CHERRY$(2)
1060 DIM PLUM$(3),ORANGE$(3),BELL$(3),
BAR$(3),DIAMOND$(3)
1065 DIM COIN$(19):COIN$="]":COIN$(19)
=COIN$:COIN$(2)=COIN$
1070 WHEEL1$="=>X?@XZ=X>?X@ZX=>X?@XZ=X
>?X[ZX=>"
1080 WHEEL2$="Z@?X>=ZX@?>X=Z[X?>=XZ@?X
>=ZX@?Z@"
1090 WHEEL3$=">ZX[@X>ZX=@X>ZX=@X>ZX=@X
>ZX=@X>Z"
1100 PLUM$="@@@":ORANGE$=">>>"
1110 BELL$="===":BAR$="ZZZ"
1120 DIAMOND$="[[[":CHERRY$="??"
1130 TEN$="XXX"
1147 REM
1148 REM **** CHARACTER SET DATA ***
1149 REM
1150 DATA 255,255,255,255,255,255,255,
255
1151 DATA 15,15,31,31,63,63,127,127
1152 DATA 240,240,248,248,252,252,254,
254
1153 DATA 1,1,3,3,7,7,15,15
1154 DATA 128,128,192,192,224,224,240,
240
1155 DATA 255,255,255,255,0,0,255,255
1156 DATA 15,15,15,15,15,15,15,15
1157 DATA 240,240,240,240,240,240,240,
240
1158 DATA 255,239,247,251,253,251,247,
239
1159 DATA 255,247,239,223,191,223,239,
247
1160 DATA 0,0,60,126,126,126,60,24
1161 DATA 24,24,24,24,24,24,24,24
1162 DATA 24,24,24,24,24,248,248,0
1163 DATA 231,195,195,195,129,0,231,25
5
1164 DATA 137,247,195,129,129,129,195,
255
1165 DATA 248,243,237,158,9,144,249,25
5
1166 DATA 227,253,194,130,131,131,135,
255
1167 DATA 255,209,213,213,213,209,255,
255
1168 DATA 255,255,129,129,129,255,255,
255
1169 DATA 247,227,193,128,193,227,247,
255
1170 DATA 254,127,254,127,254,127,254,
127
1171 DATA 60,126,209,213,209,126,60,0
1172 DATA 224,192,128,0,0,128,192,224
1173 DATA 7,3,1,0,0,1,3,7
1197 REM
1198 REM *** CHANGE CHARACTER SET ***
1199 REM
1200 CHBASE=(PEEK(742)-2)*256
1210 FOR I=0 TO 511:POKE CHBASE+I,PEEK
(57344+I):NEXT I
1240 FOR I=40 TO 111
1250 READ CH:POKE CHBASE+I,CH:NEXT I
1280 FOR I=120 TO 127
1290 READ CH:POKE CHBASE+I,CH:NEXT I
1320 FOR I=208 TO 263
1330 READ CH:POKE CHBASE+I,CH:NEXT I
1340 FOR I=448 TO 455
1350 READ CH:POKE CHBASE+I,CH:NEXT I
1360 FOR I=464 TO 511
1370 READ CH:POKE CHBASE+I,CH:NEXT I
1398 REM
1399 REM ------ DISK USERS ONLY -----
1400 TRAP 1404:OPEN #3,4,0,"D:JACKPOT.
DAT"
1401 INPUT #3:JACKPOT:PAYOFF$=STR$(JAC
KPOT):SL=LEN(PAYOFF$):POT=JACKPOT
1402 GOSUB 9000
1403 CLOSE #3:GOTO 2000
1404 TRAP 40000:CLOSE #3:PAYOFF$="0.00
"
1405 REM ---------------------------
1597 REM
1598 REM * SLOT MACHINE GRAPHICS DATA
1599 REM
1600 DATA 8,5,5,5,5,5,5,5,32,32
1610 DATA 11,5,5,32,32,32,5,5,12,32
1620 DATA 11,5,10,10,10,10,10,5,12,58
1630 DATA 11,5,61,5,90,5,62,5,12,59
1640 DATA 11,5,62,5,64,5,90,5,12,59
1650 DATA 11,5,88,5,63,5,88,5,12,59
1660 DATA 11,5,10,10,10,10,10,5,12,59,
32,93,32
1670 DATA 6,5,5,5,5,5,5,5,7,59,32,92,3
2
1680 DATA 5,5,126,32,32,32,127,5,5,60,
32,92,92
1690 DATA 5,5,5,5,5,5,5,5,5,32,92,92,9
2
1997 REM
1998 REM ***** DRAW SLOT MACHINE ****
1999 REM
2000 GRAPHICS 18
2001 SETCOLOR 0,0,14:SETCOLOR 1,1,10
2002 SETCOLOR 2,6,8:SETCOLOR 3,10,6
2003 POKE 756,CHBASE/256
2004 RESTORE 1600
2005 ? #6;"PROGRESSIVE JACKPOT!";
2006 FOR Y=2 TO 7:FOR X=6 TO 15
2007 READ CH:POSITION X,Y:? #6;CHR$(CH
)
2008 NEXT X:NEXT Y
2009 FOR Y=8 TO 11:FOR X=6 TO 18
2010 READ CH:POSITION X,Y:? #6;CHR$(CH
```

```
)
2011 NEXT X:NEXT Y
2012 POSITION 1,2:? #6;"play":POSITION
 1,3:? #6;"$";INT(IN)
2013 POSITION 1,5:? #6;"take":POSITION
 1,6:? #6;"$";INT(OUT)
2997 REM
2998 REM ** MOVE COIN & START PLAY **
2999 REM
3000 POSITION 7,1:? #6;"$";PAYOFF$
3010 SPIN1=1:POT=JACKPOT
3020 COLOR 5:PLOT 7,5:DRAWTO 7,7:PLOT
13,5:DRAWTO 13,7
3030 FOR Y=8 TO 3 STEP -1
3040 COLOR 32:PLOT 17,Y
3050 COLOR 93:PLOT 17,Y-1
3060 FOR DELAY=1 TO 15:NEXT DELAY:NEXT
 Y
3070 FOR X=17 TO 15 STEP -1
3080 COLOR 32:PLOT X,2
3090 COLOR 93:PLOT X-1,2
3100 FOR DELAY=1 TO 15:NEXT DELAY:NEXT
 X
3107 REM
3108 REM ***** PLAY 1 TO 3 DIMES ****
3109 REM
3110 IF BET=0 AND STICK(0)=14 THEN 700
0
3115 IF BET=0 AND PEEK(53279)=5 THEN 8
000
3118 REM
3119 REM ------ DISK USERS ONLY -----
3120 IF PEEK(53279)=3 THEN 15000
3121 REM ----------------------------
3122 REM
3130 IF STRIG(0)=1 THEN 3280
3140 SOUND 0,141,14,10
3150 FOR DELAY=1 TO 10:NEXT DELAY
3160 SOUND 0,0,0,0
3170 BET=BET+1
3180 IF BET<4 THEN POT=POT+0.04:IN=IN+
0.1
3181 POSITION 2,3:? #6;"  "
3182 POSITION 2,3:? #6;INT(IN)
3190 IF BET>3 THEN BET=3
3200 IF BET=3 THEN 3260
3210 IF BET=2 THEN 3250
3220 COLOR 32:PLOT 14,2
3230 COLOR 93:PLOT 11,3
3240 COLOR 13:PLOT 7,6:COLOR 15:PLOT 1
3,6:GOTO 3270
3250 COLOR 93:PLOT 10,3:COLOR 13:PLOT
7,5:COLOR 15:PLOT 13,5:GOTO 3270
3260 COLOR 93:PLOT 9,3:COLOR 13:PLOT 7
,7:COLOR 15:PLOT 13,7
3270 FOR DELAY=1 TO 50:NEXT DELAY
3280 IF STICK(0)<>13 THEN 3110
3290 POKE 77,0
3300 IF BET<1 THEN 3110
3310 POSITION 9,3:? #6;"    "
3320 PAYOFF$=STR$(POT):SL=LEN(PAYOFF$)
3330 GOSUB 9000
3997 REM
3998 REM ** PULL ARM & SPIN WHEELS **
3999 REM
4000 POSITION 7,1:? #6;"$";PAYOFF$
4001 SOUND 0,35,4,6
4010 COLOR 32:PLOT 15,4:DRAWTO 15,7
4020 COLOR 58:PLOT 15,8
4030 FOR DELAY=1 TO 25:NEXT DELAY
4031 SOUND 0,0,0,0
4032 FOR DELAY=1 TO 40:NEXT DELAY
4040 COLOR 59:PLOT 15,8:DRAWTO 15,5
4050 COLOR 58:PLOT 15,4
4060 FOR SPIN=1 TO 10+(RND(1)*30+1)
4070 POSITION 8,5:? #6;WHEEL1$(SPIN1,S
PIN1)
4080 POSITION 10,5:? #6;WHEEL2$(SPIN1,
SPIN1)
4090 POSITION 12,5:? #6;WHEEL3$(SPIN1,
SPIN1)
4100 POSITION 8,6:? #6;WHEEL1$(SPIN1+1
,SPIN1+1)
4110 POSITION 10,6:? #6;WHEEL2$(SPIN1+
1,SPIN1+1)
4120 POSITION 12,6:? #6;WHEEL3$(SPIN1+
1,SPIN1+1)
4130 POSITION 8,7:? #6;WHEEL1$(SPIN1+2
,SPIN1+2)
4140 POSITION 10,7:? #6;WHEEL2$(SPIN1+
2,SPIN1+2)
4150 POSITION 12,7:? #6;WHEEL3$(SPIN1+
2,SPIN1+2)
4160 SPIN1=SPIN1+1:SOUND 0,50,8,4:SOUN
D 0,0,0,0
4170 IF SPIN1>30 THEN SPIN1=1
4180 NEXT SPIN
4190 SPIN2=SPIN1
4200 FOR SPIN=1 TO (RND(1)*30+1)
4210 POSITION 10,5:? #6;WHEEL2$(SPIN2,
SPIN2)
4220 POSITION 12,5:? #6;WHEEL3$(SPIN2,
SPIN2)
4230 POSITION 10,6:? #6;WHEEL2$(SPIN2+
1,SPIN2+1)
4240 POSITION 12,6:? #6;WHEEL3$(SPIN2+
1,SPIN2+1)
4250 POSITION 10,7:? #6;WHEEL2$(SPIN2+
2,SPIN2+2)
4260 POSITION 12,7:? #6;WHEEL3$(SPIN2+
2,SPIN2+2)
4270 FOR DELAY=1 TO 6:NEXT DELAY
4280 SPIN2=SPIN2+1:SOUND 0,50,8,8:SOUN
D 0,0,0,0
4290 IF SPIN2>30 THEN SPIN2=1
4300 NEXT SPIN
4310 SPIN3=SPIN2
4320 FOR SPIN=1 TO (RND(1)*30+1)
4330 POSITION 12,5:? #6;WHEEL3$(SPIN3,
SPIN3)
```

continued on next page

```
4340 POSITION 12,6:? #6;WHEEL3$(SPIN3+
1,SPIN3+1)
4350 POSITION 12,7:? #6;WHEEL3$(SPIN3+
2,SPIN3+2)
4360 FOR DELAY=1 TO 9:NEXT DELAY
4370 SPIN3=SPIN3+1:SOUND 0,50,8,8:SOUN
D 0,0,0,0
4380 IF SPIN3>30 THEN SPIN3=1
4390 NEXT SPIN
4400 SPIN1=SPIN3
4997 REM
4998 REM ******** READ WHEELS *******
4999 REM
5000 LOCATE 8,5,X2:LOCATE 8,6,X1:LOCAT
E 8,7,X3
5010 LOCATE 10,5,Y2:LOCATE 10,6,Y1:LOC
ATE 10,7,Y3
5020 LOCATE 12,5,Z2:LOCATE 12,6,Z1:LOC
ATE 12,7,Z3
5030 LINE1$(1,1)=CHR$(X1):LINE1$(2,2)=
CHR$(Y1):LINE1$(3,3)=CHR$(Z1)
5040 LINE2$(1,1)=CHR$(X2):LINE2$(2,2)=
CHR$(Y2):LINE2$(3,3)=CHR$(Z2)
5050 LINE3$(1,1)=CHR$(X3):LINE3$(2,2)=
CHR$(Y3):LINE3$(3,3)=CHR$(Z3)
5060 CHECK$=LINE1$
5997 REM
5998 REM ***** CHECK FOR WINNER *****
5999 REM
6000 IF CHECK$=DIAMOND$ THEN 6500
6010 IF CHECK$=BAR$ THEN PAY=PAY+2.5:O
UT=OUT+2.5:D=D+25
6020 IF CHECK$=BELL$ THEN PAY=PAY+1.8:
OUT=OUT+1.8:D=D+18
6030 IF CHECK$=PLUM$ THEN PAY=PAY+1.4:
OUT=OUT+1.4:D=D+14
6040 IF CHECK$=ORANGE$ THEN PAY=PAY+1:
OUT=OUT+1:D=D+10
6050 IF CHECK$(1,2)=CHERRY$ THEN PAY=P
AY+0.5:OUT=OUT+0.5:D=D+5:GOTO 6070
6060 IF CHECK$(1,1)=CHERRY$(1,1) THEN
PAY=PAY+0.2:OUT=OUT+0.2:D=D+2
6065 IF CHECK$=TEN$ THEN PAY=PAY+0.1:O
UT=OUT+0.1:D=D+1
6070 IF BET=3 THEN BET=BET-1:CHECK$=LI
NE3$:GOTO 6000
6080 IF BET=2 THEN BET=BET-1:CHECK$=LI
NE2$:GOTO 6000
6090 BET=0:WIN$=STR$(PAY)
6100 IF LEN(STR$(PAY))=3 THEN WIN$(4,4
)="0"
6110 IF LEN(STR$(PAY))=1 THEN WIN$(2,4
)=".00"
6120 IF PAY=0 THEN 3020
6121 IF D=1 THEN POSITION 9,10:? #6;"
] "
6122 IF D=2 THEN POSITION 9,10:? #6;"
]]"
6123 IF D>2 THEN POSITION 9,10:? #6;"]
]]"
6124 FOR S=1 TO D:SOUND 0,26,10,12
6125 FOR DELAY=1 TO 15:NEXT DELAY
6126 SOUND 0,0,0,0:FOR DELAY=1 TO 5
6127 NEXT DELAY:NEXT S:D=0
6130 POSITION 1,8:? #6;"win"
6140 POSITION 0,9:? #6;"$";WIN$
6150 FOR DELAY=1 TO 200:NEXT DELAY
6151 POSITION 2,6:? #6;"    "
6152 POSITION 2,6:? #6;INT(OUT)
6160 POSITION 1,8:? #6;"    "
6170 POSITION 0,9:? #6;"     "
6175 POSITION 9,10:? #6;"   "
6180 PAY=0:GOTO 3020
6497 REM
6498 REM ******* SUPER JACKPOT ******
6499 REM
6500 POSITION 9,10:? #6;"]]]"
6504 FOR D=1 TO 10:SOUND 0,26,10,12
6506 FOR DELAY=1 TO 15:NEXT DELAY
6508 SOUND 0,0,0,0:NEXT D
6510 FOR Y=11 TO 2 STEP -1
6520 POSITION 0,Y:? #6;COIN$
6525 FOR D=1 TO 10:SOUND 0,26,10,12
6530 FOR DELAY=1 TO 15:NEXT DELAY
6540 SOUND 0,0,0,0:NEXT D:NEXT Y
6550 POSITION 3,8:? #6;" YOU WON IT! "
6560 FOR D=1 TO 15:SETCOLOR 2,0,14
6570 FOR DELAY=1 TO 25:NEXT DELAY
6580 SETCOLOR 2,6,8:FOR DELAY=1 TO 25:
NEXT DELAY
6590 NEXT D
6595 OUT=OUT+POT
6600 BET=0:POT=0:JACKPOT=POT:PAYOFF$="
0.00   ":GOTO 2000
6997 REM
6998 REM ****** PROGRESS CHECK ******
6999 REM
7000 GRAPHICS 18:POKE 53279,8
7010 POSITION 2,2:? #6;"PLAYED $";IN
7020 POSITION 2,4:? #6;"WON    $";OUT
7025 DIF=OUT-IN
7030 IF DIF>=0 THEN POSITION 2,6:? #6;
"NET    $";DIF
7035 IF DIF<0 THEN POSITION 2,6:? #6;"
NET   -$";ABS(DIF)
7040 IF OUT=0 THEN 7070
7050 TRAP 7070
7060 POSITION 2,8:? #6;"RETURN ";INT((
OUT/IN)*100);" %"
7070 TRAP 40000:POSITION 1,10:? #6;"PR
ESS START TO PLAY"
7080 IF PEEK(53279)<>6 THEN 7080
7090 JACKPOT=POT:GOTO 2000
7997 REM
7998 REM ******* PAYOFF CHART *******
7999 REM
8000 ? #6;CHR$(125):POKE 53279,8
8005 POSITION 2,1:? #6;"X X X .... $0.
10"
8010 POSITION 2,2:? #6;"?     .... $0.
20"
8020 POSITION 2,3:? #6;"? ?   .... $0.
```

```
50"
8030 POSITION 2,4:? #6;"> > > .... $1.
00"
8040 POSITION 2,5:? #6;"@ @ @ .... $1.
40"
8050 POSITION 2,6:? #6;"= = = .... $1.
80"
8060 POSITION 2,7:? #6;"Z Z Z .... $2.
50"
8065 POSITION 3,8:? #6;"super jackpot"
8070 POSITION 2,9:? #6;"[ [ [ .... $$$
$$!"
8080 POSITION 0,11:? #6;"PRESS start T
O PLAY"
8090 IF PEEK(53279)<>6 THEN 8090
8100 JACKPOT=POT:GOTO 2000
8997 REM
8998 REM ** FILL IN TRAILING ZEROES *
8999 REM
9000 IF POT<10 AND SL=4 THEN RETURN
9010 IF POT<100 AND SL=1 THEN PAYOFF$(
2,7)=".00    "
9020 IF POT<100 AND SL=2 THEN PAYOFF$(
3,7)=".00  "
9030 IF POT<100 AND SL=3 THEN PAYOFF$(
4,7)="0    ":RETURN
9040 IF POT<100 AND SL=4 THEN PAYOFF$(
5,7)="0  ":RETURN
9050 IF POT<100 AND SL=5 THEN PAYOFF$(
6,7)="    ":RETURN
9060 IF POT<1000 AND SL=3 THEN PAYOFF$
(4,7)=".00 "
9070 IF POT<1000 AND SL=4 THEN PAYOFF$
(5,7)="0  "
9080 IF POT<1000 AND SL=5 THEN PAYOFF$
(6,7)="0 "
9090 RETURN
14998 REM
14999 REM ----- DISK USERS ONLY -----
15000 JACKPOT=POT
15010 OPEN #3,8,0,"D:JACKPOT.DAT"
15020 PRINT #3;JACKPOT:CLOSE #3
15030 REM -------------------------
19000 END
```

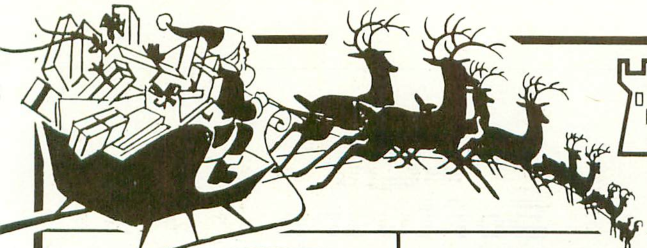
TYPO TABLE

Variable checksum = 2502900

Line num range			Code	Length
10	–	1055	KB	448
1060	–	1149	KC	366
1150	–	1161	CK	397
1162	–	1173	JK	409
1197	–	1340	JU	277
1350	–	1597	UC	313
1598	–	1690	QW	378
1997	–	2008	XI	326
2009	–	3030	HE	459
3040	–	3115	QS	340
3118	–	3181	NK	344
3182	–	3290	QW	505
3300	–	4030	MQ	323
4031	–	4130	SR	533
4140	–	4250	UL	525
4260	–	4370	LU	515
4380	–	5050	NQ	521
5060	–	6065	JI	490
6070	–	6126	LC	516
6127	–	6498	KN	383
6499	–	6560	HZ	455
6570	–	7025	PE	336
7030	–	8000	PJ	421
8005	–	8080	XC	511
8090	–	9060	TS	452
9070	–	19000	UT	269

TAKE-APART

10– 1130	Program initialization.
1147– 1370	Creation of new character set.
1398– 1405	Retrieves value of progressive jackpot from disk if data file exists, or sets it to zero if not.
1597– 2013	Draws the slot machine. This method is slow, but it eliminates the use of non-printable control characters from the listing.
2997– 3100	Moves a dime from the stack to the coin slot.
3107– 3122	Checks to see if the joystick has been pushed forward, or if [SELECT] or [OPTION] has been pressed.
3130– 3280	Counts the number of times the fire button has been pressed and adjusts the appropriate variables. Any number greater than three will be ignored. 3280 checks for joystick pull.
3290– 3330	Disables the Attract Mode. If no dimes have been played before the joystick is pulled, returns to loop at 3110.
3997– 4400	Spins wheels and stops them at random positions.
4997– 6180	Reads the appropriate combinations and checks for winners. Pays off winners and adjusts all appropriate variables.
6497– 6600	Subroutine called when Super Jackpot is won. Pays off the progressive jackpot.
6997– 7090	Subroutine called by [SELECT] button to show the payoff chart.
7997– 8100	Subroutine called by pushing the joystick forward to check on the progress of the game.
8997– 9090	Subroutine to fill in trailing zeros on progressive jackpot and payoff displays.
14998–15030	Routine called by [OPTION] button to save the progressive-jackpot amount to a data file.



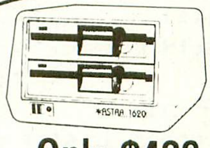
COMPUTER PALACE

(IF IT'S FOR THE ATARI... WE HAVE IT!!!)

► Look Here For Holiday Gift Ideas! ◄

Astra 1620 DISK DRIVE

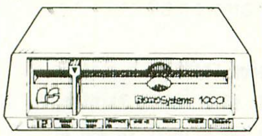
Double Density
Double Drives



Only $488 + FRT

Rana 1000 DISK DRIVE

Single or Double Density



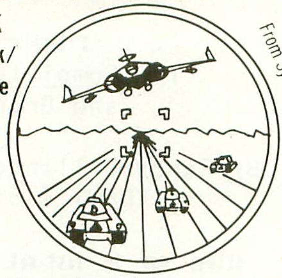
Hi-Tech, Low-Profile Styling

Only $349 + FRT

Dimension X

32K Disk/Tape

From Synapse



What has unlimited power... scrolling perspective... & excitement???

THIS DOES!!! **$31.50**

FREE Catalog

With any order, or send $1 (refundable with purchase).



Send us your name & address for FREE FLYERS with Special Offers!

Over 1000 items for your Atari...

- Synapse
- Percom
- Datasoft
- Epson
- Atari
- APX
- A.I.
- On-line
- Amdek
- Hayes
- Visicalc
- Much more...

Use Your Credit Cards!

We honor VISA, American Express, & MasterCard.

The Monkey Wrench II

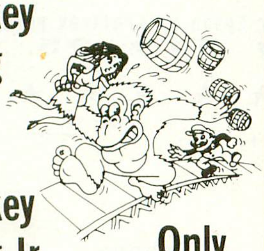


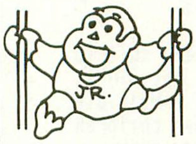
$54.00

This is a BASIC & Machine-language **Programmers Aid** for the 800. It plugs into the right slot, and works with Atari BASIC to add 16 new direct-mode commands(Incl. Auto line numbering, Delete lines, Renumber BASIC, Hex-Dec conv., Find string, Move lines, Exchange string, Disk directory from BASIC, Mem. test, More.) Also includes a monitor with 15 commands to interact with the 6502. This has been proven to be a very helpful tool when writing your own programs!

A cartridge for the right-hand Slot of your Atari 800!

Donkey Kong (or) Donkey Kong Jr.





Only $44.90 Each

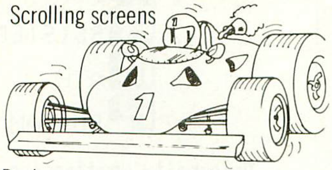
From Atari

Both on 16K Cartridge from Atari

Rally Speedway

Want'a Race????
Here's your game!!!

Scrolling screens



Design your own course!

From Adventure International

16K Cartridge **$44.90**

FOOT BALL



- One or Two Players
- 24K RAM Disk or Tape

★ Pass
★ Run
★ Kick

Disk/Tape **$28.90**

From Gamestar

Baseball

Super Sharp Colorful and Smooth Graphics, with 2-Player Option make this a Great Entertainer.



32K DISK or TAPE

$28.90 From GAMESTAR

EDUCATIONAL PROGRAMS

Math Tic-Tac-Toe (D,T)	17.95
Type Attack (D)	35.10
Pre-School I.Q. (D,T)	21.90
Vocabulary Builder (D,T)	21.90
Preparing for the S.A.T. (D,T)	112.00
Math UFO (D,T)	24.95
Spelling Genie (D)	24.95
Kindercomp (D)	26.90
Rhymes & Riddles (D)	26.90

BUSINESS PROGRAMS

Personal Finance (D)	67.50
Letter Perfect (D,C)	89.90
Data Perfect (D)	89.90
Spell Perfect (D)	89.90
Atari Writer (C)	87.90
Text Wizard & Spell Wizard (D)	SET 72.50
Super Mailer Plus (D)	49.95
B/Graph (D)	89.90
Payroll (D)	195.00
Label-It (D)	19.95
Visicalc (D)	149.95

SUPER SPECIALS!

LIMITED QUANTITIES—WHILE SUPPLIES LAST!
(PLEASE LIST YOUR SECOND-CHOICE WHEN ORDERING)

	Reg.	Special	
Kid Grid (D)	30.00	17.95	
Gorf (D)	40.00	19.95	
Wizard (D)	40.00	19.95	
Shamus II (T)	35.00	17.95	
Ricochet (D,T)	20.00	9.95	Wow
Rescue at Rigel (D)	30.00	17.95	
Survival of Fittest (C)	40.00	17.95	
Magic Mail (D)	60.00	29.90	
Bug-Off (D)	30.00	14.95	
Snake Byte (D)	30.00	9.95	Super
Alien Swarm (D,T)	30.00	9.95	Look
Genetic Drift (D,T)	30.00	19.90	
Chicken (D,T)	35.00	19.90	
Slime (D,T)	35.00	19.90	

	Reg.	Special	
6502 Disassembler (T)	20.00	6.95	Steal
Turmoil (C)	35.00	15.95	
6502 Assembler (T)	30.00	12.95	
Platter Mania (D)	40.00	17.95	
Sentinel One (D,T)	35.00	9.95	Wow
Guardian Gorn (D,T)	35.00	9.95	
Intruder (D,T)	35.00	9.95	Look
Atari Mailing List (T)	30.00	9.95	
Hockey (D,T)	30.00	9.95	
Pogo Man (D,T)	30.00	9.95	Great
Serpentine (D,T)	30.00	14.95	
Apple Panic (D)	30.00	14.95	
Visicalc (D)	250.00	149.95	
Capt. Beeble (C)	40.00	24.95	

BOOKS

Your Atari Computer	16.95
Technical Users Notes	26.90
Compute's 1st Book of Atari	12.95
Compute's 2nd Book of Atari	12.95
Machine Language for Beginners	12.95
Mapping the Atari	14.95
Atari Source Book	12.95
Atari Graphics	12.95
De Re Atari	17.90
Inside Atari DOS	19.95
Kids & the Atari	19.95
Visicalc Book	14.95
Book of Atari Software	19.95

MAGAZINES

ANTIC, Vol. 2/No. 6	2.50
ANTIC, Vol. 2/No. 5	2.50
ANTIC, Vol. 2/No. 4	2.50
ANTIC, Vol. 2/No. 3	2.50
ANTIC, Vol. 2/No. 2	2.50
A.N.A.L.O.G., No. 13	2.50
A.N.A.L.O.G., No. 12	2.50
A.N.A.L.O.G., No. 11	2.50

ORDER FORM

Name ______________________ Phone ______________
Address ______________________________________
City ______________________ State ______ Zip ______

Use additional sheet, or phone your order 1-800-452-8013 TOLL FREE

Quan	Description	D/T/C	AMOUNT

MISSION REDUX

Disk drive daze

by DAVID and SANDY SMALL

Welcome to this month's episode in a continuing saga of life in computerdom's fast lane. If you haven't been following the story, here's a quick recap of what you've missed: In "Nightmare Mission," we explained our assignment, which was to develop a full-fledged aircraft simulation game in a very short amount of time. To complete this project on schedule, we had to use the fastest and best tools available, as well as some pretty wild techniques. We've been talking about these tools and techniques in order to save you, the advanced programmer, time — your most valuable, and most expensive asset.

In "Nightmare Mission" and "Mission Accomplished," we covered the assembler, MAC/65, and the revolutionary debugging tools we used for the project. This month, we will talk about disk drives. Briefly, as a professional programmer, what sort of disk drive do you need? Which one is best? After all, there are numerous models available for use with the Atari.

First, let's group the available drives into two classes: slow and fast. The slow group includes the Atari 810, Percom, ATR-8000, and Rana. The fast group includes the Corvus hard disk, RAMDISK, LE Systems drive, and (to a lesser extent) the Happy modification to the Atari 810.

The fast group is four to eight times speedier than the slow group. Speed comes right out of your time, so think seriously before purchasing a slow drive. Consider how much time you spend waiting on the disk drive; you have to:

- wait for DOS to boot
- wait to load MAC/65 (or AMAC)
- wait to load your program
- wait to save your program
- wait for your object code and print file to be written to disk
- wait for the DOS menu

And so on and so on.

As owners of the RAMDISK discovered long ago, getting rid of such delays greatly increases productivity. That's why Atari recently purchased and installed a number of RAMDISKs for their in-house development labs. At the time, it was the speediest device available.

Ask yourself this question: in a typical six-month game development cycle, how much of your valuable time is spent waiting on the disk? Multiply this by what you hope to earn per hour. Perhaps the added cost of a fast disk drive is not unjustified.

We'll cover the slow drives first, but bear in mind that we recommend these drives *only* if you cannot afford something faster.

To "begin by summarizing," our basic procedure is to stick with a product that has been around for awhile and has had its bugs worked out. Don't buy a brand new product and become the beta-test site for that new product's developer! This applies to both slow and fast drives.

SLOW DRIVES

1. Atari 810. This product has been a never-ending slow-motion disaster for Atari from the beginning. First, it was designed without a data separator, a real no-no. This was eventually patched. Next, it was discovered that the RPM on the drive varied widely. Again, a fix was eventually developed. The interleave pattern was also incorrectly laid out; this was corrected in the "C" ROM. Finally,

continued on next page

David and Sandy Small are professional programmers who work extensively with Atari computers and Atari-compatible peripherals and software to produce commercial software for the Ataris. In Systems Guide, they share discoveries, insights, experiences and secrets of professional programming that should be of interest to others at or near their level of practice. Questions or suggestions can be addressed to the Smalls care of ANTIC. Responses are not guaranteed, but may be made individually (if a self-addressed, stamped envelope is provided) or publicly in this department.

Atari switched mechanisms from MPI to Tandon; this was okay except for the fact that Tandons are very good at off-centering floppy disks. The solution? Only put in a floppy when the drive is spinning. Flip it off and on if you have to, but make sure that the motor is running before you insert a disk and close the door. (On the new 80-track drives from Nearly Anyone the act of inserting a disk kicks the motor on for two or three seconds, so the motor is running when you close the door. There is a very good reason for this; 80-track drives are extremely sensitive to proper centering. It would be nice if Atari, or Happy, added this feature into a new disk ROM.)

We hate to say it, but we cannot recommend even the *new* Atari 810's to professional programmers. There are less expensive, and far more reliable, alternatives on the market. If you are a beginner on the Atari, perhaps the 810 is a good thing for you; it is quite straightforward to hook up and use, especially compared to some of the alternatives. But if you have been around the Atari for awhile, the 810 is out: it wastes too much of your time and is too expensive.

2. Percom drive. For awhile, the Percom was considered the "drive of choice" among the slower drives. This is because at the time it was introduced anything was better than an 810! Once again, however, the user base has become a beta-test site. The horror story we have heard is that no matter how a disk performs during formatting on a Percom drive, the Percom will always tell the Atari that everything is okay. You could put a paper plate into the Percom, tell the drive to format, and the unit would tell the Atari that the plate was a perfectly good disk.

Replacement ROM's are available, however, if you push hard enough, and if someone who knows what's going on happens to be in Percom's office.

Finally, Percom corporate is quickly losing interest in the Atari, a point that was most evident during my last visit there.

My conclusion: Percom is a drive whose time has passed.

3. ATR-8000. We could rave about the ATR for the rest of this column, but there are other things to discuss. Very simply, we highly recommend this unit to nearly anyone who wants an Atari disk drive; the only exception would be someone who is completely unable to handle disk drive interconnections and drive selection.

This is a well-thought-out and well-executed unit. We took a look at the source code to the ROM and CP/M BIOS and knew in ten seconds that we had seen the work of a far better programmer than ourselves, one Russell Smith of BigBoard and Xerox 820 fame. The ATR-8000 has sheer class in terms of disk-handling power, far more than we have seen in any other system.

The base ATR-8000 is a fine disk controller and printer spooler, and if you ever want to upgrade the unit's memory you'll get CP/M-80 in the bargain. (CP/M is an operating system that gives you access to a huge library of practical software.)

We should note that we have an ATR-8000 (serial #4) and continue to use it and like it; we're writing this article using CP/M's "Wordstar" on the ATR-8000 with two eight-inch disks. Eight-inch disks can be used with the Atari 800 via MYDOS, which allows all 2002 sectors of a standard 8″ to be accessed. That's 241K per disk. No more disk swapping!

The ATR has had its bugs, and we're up to revision 3.1 on the ROM, but most of the bugs seem to be out. Support has been outstanding. Summary: A great buy.

4. Rana Elite. This is a brand new drive. It seemed to work quite well when I tried it out last week. However, remember that companies like Atari, Percom and SWP (ATR-8000) couldn't get it right the first time, or the second, or the third . . . We think some bugs can reasonably be expected. Our advice would be to wait and see how it works out.

Also worthy of consideration is double density. Double density is a mixed blessing for you, the software developer. In many ways it is convenient. But Atari has never supported double density officially, and there are problems involved in its Operating System's dealings with 256-byte sectors. New DOS's (like MYDOS, from SWP) solve a lot of these problems, but cannot be used with any copy-protected (or a lot of other) software. Also, be very wary of AMAC/MEDIT with double density; real "Twilight Zone" stuff seems to happen occasionally with it. Our advice? Double density is fine for software development, but forget about it for a lot of other uses. An investment in MYDOS would do you well, however; this is the first DOS we have seen that lets you access the Percom standard DD/SD commands (supported by Percom and SWP) directly.

FAST DRIVES

So much for the slow drives. Now let's talk about the faster alternatives.

1. Corvus hard disk. Sure, it costs over $2,000. But it's very fast and gives you a lot of storage. If you do quite a bit of software development, it will pay for itself quickly.

The smallest (5Mb) Corvus contains the equivalent of 59 single-density floppy diskettes in storage. The largest (20Mb) contains the equivalent of 192 floppies. Corvus also supports networking and multiple-Atari systems hooked to one drive. Software houses take note: you can run several Ataris off one Corvus at high speed, and gain programmer productivity.

The only "problem" with the Corvus is that the operating system is customized for the machine. While the OS works correctly, you cannot use anything that is copy protected or anything with a custom DOS, like valFORTH. Other than that, we recommend the unit highly. We have one, love it, and use it for any software development we do on the Atari; these days we only use floppies for interchanging data with other systems.

2. RAMDISK (now called RAM-POWER-128). This unit is a fine, inexpensive alternative to the Corvus; it can be had for $200. The unit is a memory board, containing 128K, which plugs into the middle slot of the Atari; 92K is assigned to emulate a single-density drive. It does so at an incredibly fast speed; the RAMDISK is the fastest "disk drive" you can get for the Atari. It

speeds up assembly times, loading the DOS menu, and so forth tremendously.

However, the RAMDISK requires a special DOS, which makes it incompatible with a large amount of software. Keep in mind, for example, that you are not going to be able to sort your Visicalc spreadsheets with the RAMDISK; Visicalc is copy-protected.

Another major problem is that the RAMDISK loses its data when the Atari is turned off, or during a system crash. Because you can expect to crash many times during the development of your software, a RAMDISK may prove to be more frustrating than useful. However, if you are involved in an application in which you frequently re-assemble code, don't crash a lot, and can use the RAMDISK more than once per session, we highly recommend the unit.

3. **LE Systems disk drive.** Since we own part of LE Systems, we really should not do more than mention the name. This is a very expensive and fast floppy drive, suited only to software developers and those who need fast diskette duplication in massive quantities. A single drive unit starts at $1,150.

4. **Happy 810.** The Happy board is a real success story. Richard Adams, the brother of Scott Adams of Adventure International, designed a new board for the Atari 810 that makes it capable of a great number of things. To begin with, disk accesses on the Happy 810 are track-buffered, so you can get to data on the disk much more quickly. Also, the quirky bugs in the 810 are fixed in this version.

The speed of this unit is considerably faster than that of a plain 810. If you already have an 810, and want to make a minimal investment, making a Happy modification to your present drive would be an exciting and excellent idea.

Summary: This is a very good system.

Now for a brief look "on the horizon."

The Atari serial bus is the primary reason that the slow drives are slow. Recently, however, an interesting method for dealing with the serial bus has been receiving more and more attention. The new method involves clocking the bus from a slower frequency. This change enables more data to be transferred across the bus in less time; the typical speedup averages around four times the previous speed.

Happy's new Warp DOS seems to use this modification, although we cannot be sure of this. (Happy does not provide the source code to their system), and Percom's new hard disk for the Atari seems to be destined to use this system as well. Be forewarned, however: the system requires a custom DOS on the system end to replace the serial I/O drives in ROM. Note the different sound of the Warp DOS in operation: is it the serial bus being clocked at a different frequency?

Percom's hard disk is still up in the air. When we visited the company, there was a definite lack of interest in Atari; with the IBM PC taking over much of the market, Percom is putting most of its efforts in that direction. Consequently, the decision to produce the hard disk for the Atari has not been made, and is still tied up in office politics at the moment. We will see. Preliminary discussions with the designer of the prototype, though, indicate that the reclocked serial bus will be used, along with a new tree-structured DOS from OSS — if the product ever makes it out of the decision committee.

As software designers, we have been intensely aware of the Atari disk drive and its problems, and have tried many alternatives. That's why we have an ATR-8000, RAMDISK, LE Systems disk drive, and a Corvus; each of these has a special application in which it is the best unit available.

Unfortunately, the RAMDISK and Corvus have problems in their operating systems that make them incompatible with much of the software on the market. There is a product that solves these problems, however. It's the Integrater board, and it makes the RAMDISK and Corvus coexist with anyone's DOS. It even lets you start up directly from the Corvus, not from an 810 as with Corvus DOS. However, we are again in the position of highlighting a product that we helped design, so we shouldn't say anything more.

We hope you have enjoyed this discussion of disk drives. During the development of our aircraft simulation game, we started out using LE Systems drives, and later switched to a Corvus; this was a major reason we completed the product on schedule.

Be sure to tune in next month when we cover a hot new topic: the secrets of bank selection.

The list below shows which of the disk drives we have recommended are available in a given price range:

$ 200–$ 300:	RAMDISK or Happy disk drive modification
$ 300–$ 600:	ATR-800 with five-inch floppies
$ 600–$1000:	ATR-8000 with eight-inch floppies and MYDOS
$1000–$2000:	LE Systems disk drive
$2000 and up:	Corvus (5, 10, and 20 Mbyte units)

LIST OF MANUFACTURERS

Atari Inc.
(you cannot order directly from Atari)

Axlon Inc. (RAMDISK)
70 Daggett Dr.
San Jose, CA 95131
(408) 945-0500

Corvus Inc.
2029 O'Toole
San Jose, CA 95050
(408) 946-7700

Happy Computing
P.O. Box 32331
San Jose, CA 95152
(408) 251-6603

LE Systems
13010 Research #220
Austin, TX 78759

Percom Data Corp.
11220 Pagemill Road
Dallas, TX 75423
(214) 340-7081

Rana Systems
21300 Superior St.
Chatsworth, CA 91311
(800) 421-2207

SWP, Inc. (ATR-8000)
2500 E. Randol Mill Road, Ste. 125
Arlington, TX 76011
(817) 469-1181

continued from page 76

```
1580 PL0H=INT(PL0/256):PL0L=PL0-256*PL
0H:RETURN
1590 PL1H=INT(PL1/256):PL1L=PL1-256*PL
1H:RETURN
1600 ? "⊠YOU HAVE EXCEEDED THE NUMBER
OF":? "BYTES ALLOWED WITH VALUES":? "O
F 155 OR 34!"
1610 ? "PLEASE USE A DIFFERENT VALUE!"
:TRAP 1600:X=X-1:NEXT X
1620 ? "⊠YOUR MOVEMENT LIMITS ARE NOT"
:? "COMPATIBLE WITH THE INITIAL POSITI
ON!":? "PLEASE CHECK VALUES":GOTO LINE
1630 ? "⊠GR.11 NEEDS A BACKGROUND HUE
OF ZERO!":? "I'VE SET THAT!":? :RETURN
1640 ? "⊠GR.9 NEEDS A BACKGROUND LUMIN
ANCE":? "OF ZERO! I'VE SET THAT!":? :R
ETURN
```

TYPO TABLE

Variable checksum = 2757423

Line num range			Code	Length
10	-	60	TC	507
70	-	140	OH	509
150	-	200	RZ	537
210	-	250	AG	550
260	-	320	IL	509
330	-	380	VS	509
390	-	440	VO	571
450	-	510	BK	576
511	-	560	SQ	521
570	-	615	JU	504
620	-	690	OP	556
700	-	780	OA	500
790	-	850	UP	556
860	-	920	NY	540
930	-	1005	HQ	542
1010	-	1090	EE	452
1100	-	1180	EB	545
1190	-	1250	SV	525
1260	-	1310	FO	575
1311	-	1330	DK	589
1340	-	1420	BC	535
1430	-	1540	HJ	529
1550	-	1620	EN	533
1630	-	1640	IE	147

```
00010 ;*****************************
*
00020 ;   VBI PLAYER MOVER 1.0
00030 ;      BY F.PINHO 7/83
00040 ;   ASSEMBLE WITH ASM/ED
00050 ;   HALF-SPEED ROUTINE
00060 ;   NOP'S IN CODE CHANGED BY
00070 ;   BASIC FOR NORMAL SPEED
00080 ;*****************************
00090            *=  $600     ;RELOCATAB
LE
00100 STICK0     = $0278
00110 STICK1     = $0279
00120 XITVBV     = $E462
00130 HPOSP0     = $D000
00140 HPOSP1     = $D001
00150 PB1        = 203
00160 PB2        = 204
00170 STPLL      = 205
00180 STPLH      = 206
00190 VPSP0      = 1000
00200 VPSP1      = 1001
00210 STPL0L     = 1002
00220 STPL1L     = 1003
00230 STPL0H     = 1004
00240 STPL1H     = 1005
00250 UPL0       = 1006
00260 UPL1       = 1007
00270 LL0        = 1008
00280 LL1        = 1009
00290 LFL0       = 1010
00300 LFL1       = 1011
00310 HPOST0     = 1012
00320 HPOST1     = 1013
00330 RTL0       = 1014
00340 RTL1       = 1015
00350            LDX #0       ;PLAYER NUM
BER
00360 B0         LDA STICK0,X;READ JOYST
ICK
00370            AND #1       ;CHECK FIRS
T BIT
00380            BNE B1       ;IF BIT SET
,KEEP CHECKING
00390            BEQ UP       ;BIT CLEAR,
GOTO UP
00400 B1         LDA STICK0,X;READ STICK
00410            AND #2       ;SECOND BIT
00420            BNE B2       ;BIT SET?
00430            BEQ DOWN     ;CLEAR.GO D
OWN
00440 B2         LDA STICK0,X
00450            AND #4       ;THIRD BIT
00460            BNE B3       ;BIT SET?
00470            BEQ LFTI     ;CLEAR. GO
LEFT
00480 B3         LDA STICK0,X
00490            AND #8       ;FOURTH BIT
00500            BNE STICK    ;IF BIT SET
,GO ON
00510            BEQ RIGHTI   ;CLEAR.GO R
IGHT
00520 STICK      INX          ;NEXT PLAYE
R
00530            CPX #2       ;ALL DONE?
00540            BEQ EXIT     ;YES.EXIT V
BI
00550            BNE B0       ;NO.REPEAT
00560 EXIT       JMP XITVBV   ;BACK TO AT
ARI VBI
00570 UP         LDA VPSP0,X ;VERTICAL P
OSITION
```

continued on next page

```
00580           TAY          ;HOLD IN Y
00590           DEY          ;DOWN ONE
00600           NOP          ;CHANGED BY
 BASIC
00610           TYA
00620           CMP UPL0,X   ;TOO FAR?
00630           BCC B1       ;YES. GO BA
CK
00640           STA VPSP0,X  ;NO.STORE N
EW VERTICAL
00650           INY          ;BACK TO OL
D LOCATION
00660           NOP
00670           LDA STPL0L,X;PLAYER DAT
A ADDRESS LOW
00680           STA STPLL    ;STORE IN W
ORKING LOCATION
00690           LDA STPL0H,X;ADDRESS HI
GH
00700           STA STPLH
00710 UPLP      LDA (STPLL),Y;GET BYTE
00720           DEY          ;DOWN ONE
00730           NOP
00740           STA (STPLL),Y;STORE AT
NEW LOCATION
00750           INY          ;GO BACK FO
R NEXT BYTE
00760           INY
00770           NOP
00780           DEC PB1      ;DECREASE C
OUNTER
00790           BPL UPLP     ;IF NOT DON
E,DO IT AGAIN
00800           LDA PB2      ;RELOAD INI
TIAL COUNTER VALUE
00810           STA PB1      ;RESET COUN
TER
00820           CLC          ;FORCED BRA
NCH
00830 RETURN1   BCC B1
00840 RIGHTI    BEQ RIGHT    ;INTERMEDIA
TE BRANCH POINT.USED TO EXTEND RANGE
00850 RTN2I     BCC B2       ;SAME
00860 B3I       BCC B3       ;SAME
00870 LFTI      BEQ LEFT     ;SAME
00880 STKI      BCC STICK    ;SAME
00890 STICKI    BCS STICK    ;SAME
00900 DOWN      LDA VPSP0,X  ;OLD VERTIC
AL
00910           TAY          ;HOLD IN Y
00920           INY          ;UP ONE
00930           NOP
00940           TYA
00950           CMP LL0,X    ;TOO FAR?
00960           BCS B2       ;YES. GO BA
CK
00970           STA VPSP0,X  ;NO. STORE
NEW VERTICAL
00980           DEC PB1      ;GO TO TOP
OF IMAGE
00990           DEC PB1
01000           DEC PB1
01010           NOP
01020           NOP
01030 DLP       INY
01040           DEC PB1
01050           BNE DLP      ;DONE?
01060           LDA PB2      ;YES. RESET
 COUNTER
01070           STA PB1
01080           LDA STPL0L,X;PLAYER ADD
RESS
01090           STA STPLL    ;STORE IN W
ORKING LOCATION
01100           LDA STPL0H,X
01110           STA STPLH
01120 DWNLP     LDA (STPLL),Y;GET TOP I
MAGE BYTE
01130           INY          ;UP ONE
01140           NOP
01150           STA (STPLL),Y;STORE AT
NEW LOCATION
01160           DEY          ;BACK FOR N
EW BYTE
01170           DEY
01180           NOP
01190           DEC PB1      ;DECREMENT
COUNTER
01200           BPL DWNLP    ;IF NOT DON
E,GO BACK
01210           LDA PB2      ;RESET COUN
TER
01220           STA PB1
01230           CLC
01240 RETURN2   BCC RTN2I    ;FORCED BRA
NCH
01250 LEFT      LDY HPOST0,X;OLD HORIZO
NTAL POSITION
01260           DEY          ;MOVE LEFT
ONE
01270           NOP
01280           TYA
01290           CMP LFL0,X   ;TOO FAR?
01300           BCC B3I      ;YES. GO BA
CK
01310           STA HPOST0,X;STORE NEW
HORIZONTAL
01320           STA HPOSP0,X;STORE IN H
ARDWARE REGISTER
01330           CLC
01340 RETURN3   BCC B3I      ;FORCED BRA
NCH
01350 RIGHT     LDY HPOST0,X;SAME FOR R
IGHT MOVEMENT
01360           INY
01370           NOP
01380           TYA
01390           CMP RTL0,X
01400           BEQ GOON
01410           BCS STICKI
01420 GOON      STA HPOST0,X
01430           STA HPOSP0,X
01440           CLC
01450 RETURN    BCC STKI     ;FORCED BRA
NCH
```



Craftsmen Need Precision Tools . . . Programmers! Demand Precision Software!

BASIC XL has twice the speed and twice the power of Atari® BASIC. And yet, as befits a fine craftsman's tool, **BASIC XL** is even easier to use and more dependable, while including such outstanding major additions as structured programming, string arrays, programming aids, enhanced graphics, and business capabilities.

Atari BASIC is a good starting point. We should know. We wrote it in 1978. Buy **BASIC XL.** Take advantage of five more years of experience!

So, prepare yourself for some exploration into imaginative programming with **BASIC XL!** Cartridge, excellent tutorial, reference manual . . . $99.

OSS™
Precision Software Tools
1173D S. Saratoga/Sunnyvale Road
San Jose, CA 95129 · (408) 446-3099

Functional, honest, and beautiful describe the simple lines of a craftsman's tools. For the jeweler these tools are an extension of the human hand to better execute complex designs. For you, the programmer, Precision Software Tools keep complications out of your programming while allowing you to produce intricate programs.



See the complete collection of OSS Precision Software Tools!™

- MAC/65: The fastest 6502 macro assembler/editor package on cartridge . . . $99.
- BUG/65: A powerful debugger. On disk, with OS/A+ . . . $35.
- C/65: The first native mode "small c" compiler for Atari and Apple® computers. On disk . . . $80.
- ACTION!: The fastest, small computer language ever. A feature-packed cartridge at only . . . $99.

All products on disk include OS/A+ and also require 48 K.

SEE YOUR LOCAL DEALER!

Call or write for informative brochures.

ATARI and APPLE II, are trademarks of Atari, Inc. and Apple Computer, Inc., respectively. MAC/65, BUG/65, C/65, BASIC XL, OS/A+, and OSS PRECISION SOFTWARE TOOLS™ are trademarks of O.S.S. INC. ACTION! is a trademark of Action Computer Products.

ANTIC PIX CONTROLLERS

by DAVID DUBERMAN

ANTIC Staff



JoySensor

JOY-SENSOR
by Suncom

Instead of a stick, **Joy-Sensor** uses a flat, round, touch-sensitive disk to control on-screen movement. It's somewhat like using a track ball that you only control with your thumb. For games that require only four directions of movement (e.g. **Pac-Man**), a switch on the panel lets you lock out sensitivity to diagonal movement. At top, a flat rectangular strip is used to control firing functions. Press at either end for manual fire, and at the center for rapid fire. Joy-Sensor makes for a unique game-playing experience. Suncom, Inc., 650 E. Anthony Tr., Northbrook, IL 60062.

COMMAND CONTROL THREE-WAY DELUXE JOYSTICK
by WICO

A new concept in joysticks, the **Wico** lets you switch your joystick handle to fit the game you're playing. All three grips allow you to fire from either the top of the stick or the base. Wico has extensive experience in the controller business, so they know how to build a stick to last — as witnessed by their two-year warranty. This is a smooth-handling, solidly built joystick. WICO Corp., 6400 W. Gross Point Rd., Niles, IL 60648.



Command Control Three Way Joystick



Kraft Joystick

KRAFT JOYSTICK
by Kraft

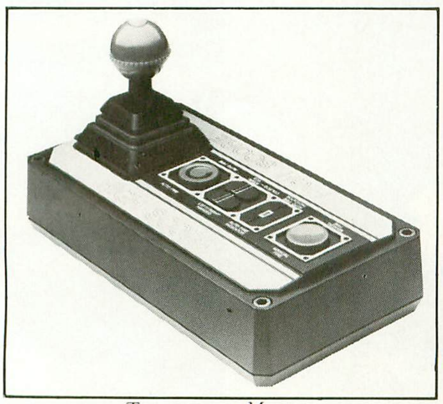
Kraft, the nation's largest manufacturer of control sticks for various applications, has produced a precision controller for Atari VCS and computers. The base is suitable for table-top use, but is small enough to fit in your hand if you prefer. The fast-acting internal switches are built to endure heavy use. The **Kraft Joystick** features a spring-return stick mechanism and an eight-foot cord. Kraft Systems Co., 450 W. California Ave., Vista, CA 92083.



PointMaster

POINTMASTER PRO
by Discwasher

The **PointMaster Pro** combines design ingenuity with sturdy workability resulting in a fine joystick. The first thing you notice is that the base has suction cups allowing you to keep one hand free. The sensitive fire button is located at the top of the contoured pistol-type hand grip. An effective rapid-fire circuit is built into the stick, and actuated by pressing a red button. A red LED lights when this condition is in effect. All in all, this is a well-designed joystick intended for increasing your arcade scores. Discwasher, 1407 N. Providence Rd., Columbia, MO 65205.



Tournament Master

THE HS20 TOURNAMENT MASTER
by High Score

The **Tournament Master** looks more like the control panel on a piece of high-tech equipment than it does like a joystick. Controls include a ball-head joystick with a trigger at top, manual and auto-fire, coin-op size firebuttons, and a left/right-handed mode selector. This last reverses up, down, left, and right directions when the HS20 is turned around for left-handed play. The console is balanced and weighted for a minimum of unwanted movement during frenetic game play.



Starfighter

STARFIGHTER
by Suncom

A more conventional type of joystick than those described heretofore, the **StarFighter** is, however, by no means inferior. The base is about the same size as the original Atari joysticks, but this is the only similarity. The stick is fairly short and wide, with a rounded top. The best thing about the StarFighter is the way the switches close — there is no question about when a contact is made. A definite "click" is felt, both in the joystick and the fire button. StarFighter comes with a two-year warranty.

VIDEO COMMAND
by Zircon

Built like a jet fighter joystick, the **Video Command** gives you ultimate control over your on-screen counterpart, helping to improve your scores. The joystick's tapered grip is held in the hand, not placed on a table. Zircon provides a booklet entitled "The Power to Win" with tips on using the stick to best advantage with different types of games. Zircon International, Inc., 475 Vandell Way, Campbell, CA 95008.



Video Command

JOYBOARD
by AMIGA

The first joystick you stand on, the **Joyboard** is controlled by your entire body. Plug a normal joystick into the joyboard for a fire-button function. Now you can get in shape as you destroy the aliens! The Joyboard's price has recently been reduced by 20%. The Joyboard comes with a VCS skiing game called Mogul Maniac. AMIGA Corp., 3350 Scott Blvd., #7, Santa Clara, CA 95051.



Joyboard

POWER-STICK
by AMIGA

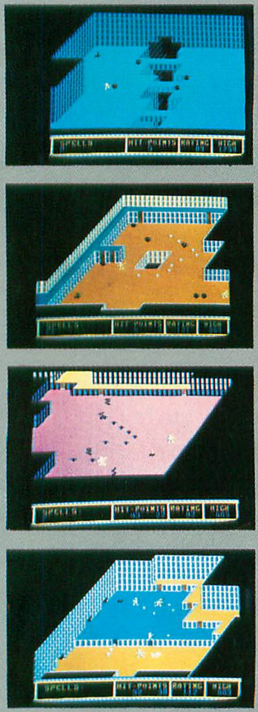
Probably the tiniest joystick is the **Power-Stick**, and smaller may be better in many ways. For one thing it is easy for small children to hold, and control is exercised with delicate movements of the fingers instead of gross (and tiring) movements of the wrist and hand. Design features fire buttons on each side and "twice as many" contact points for precise direction control.

QUESTAR CONTROL CONSOLE
by Questar

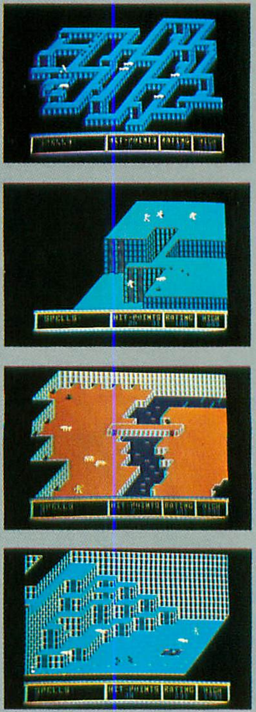
No controller gives you more of a feeling of being in a real arcade than this one. It's quite handsome, and is also the biggest joystick we have seen. Measuring 8″ by 12½″ at the base, the **Questar** is

continued on page 122

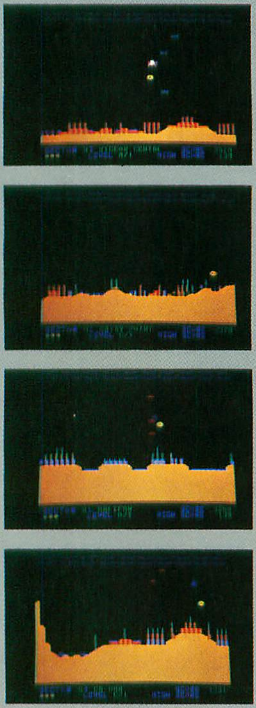
Two for the ATARI* from BRAM Inc. by Mike Edwards



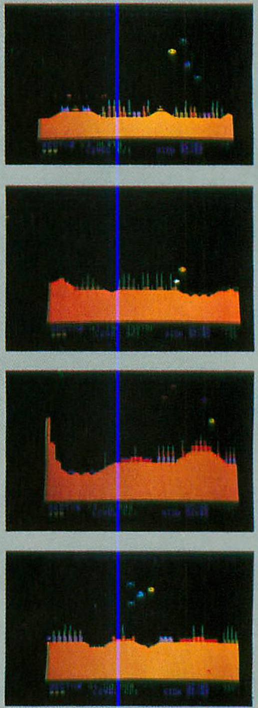




The exciting new arcade hit that features scrolling 3D graphics, on-line instructions, one or two player cooperative, seven different dungeons, 74 different screens, high score save to disk, full sound and color, zombies, poisonous snakes, giant spiders, evil orbs, scrolls, talismans, magic spells, lost crowns and spectacular underground scenery. 48K tape and disk. $34.95







If you're ready for the most challenging arcade space-war game, you're ready for ATTACK at EP-CYG-4. This is an adventure for experienced arcaders. EP-CYG-4 features 3 missions, 130 screens*, Tartillian attack fighters, Cruisers, ground batteries, landscapes, seascapes, Gravitron drive ships, Lyso-blast weapons, advanced joy stick controls, one or two player cooperative.

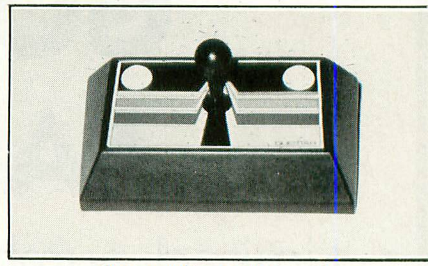
"I'd recommend EP-CYG-4 to any gamer who is looking for new concepts and challenges in his or her gaming life." D. Duberman, December, 1982 ANTIC

*Disk 32K $32.95; tape 16K $29.95; 2 missions, 70 screens

BRAM Inc.
18779 Kenlake Place N.E. Seattle, Washington 98155 (206) 486-8428

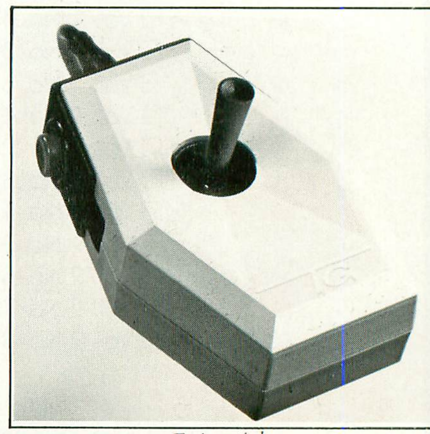
ANTIC PIX CONTROLLERS
continued from page 119

made with full-sized arcade components. The switches are leaf type, and you can adjust them for sensitivity to your joystick movements. As long as you have enough room for this baby, it will serve you well.



Questar Control Console

Also from Questar comes the **Blaster**, an adjustable-speed, rapid-fire module. Simply attach the Blaster between your joystick and your computer or game console. You'll achieve new high scores on games like Zaxxon and Defender immediately. Questar Controls, Inc., 670 N.W. Pennsylvania Ave., Chehalis, WA 98532.



Enjoystick

ENJOYSTICK

by TG Products

TG is one of the few companies that produce both games and controllers, and this time they've come up with a winner. The **Enjoystick** was designed to fit comfortably in the palm of the hand, and that it does. The stick itself operates very smoothly and is self-centering. The fire button is on the left side, but can be flipped around to the other side for use by left-handed players. This hexagonal controller is excellent for maze games and those that require motion about the entire screen. TG Products, Inc., Plano, TX 75074.

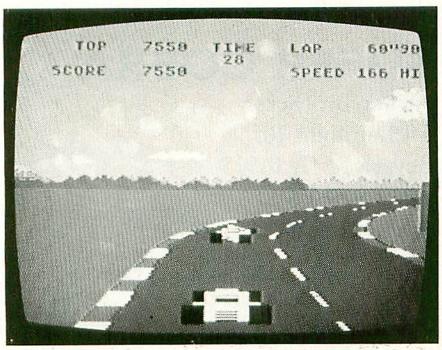
TWO FROM ATARI

POLE POSITION

Atari, Inc.
P.O. Box 427
Sunnyvale, CA 94086
(408) 745-2000
$49.95, 16K — cartridge

Reviewed by Brian Ho Fung

Pole Position has just been released by Atari as a successful adaptation of the popular arcade game for its home computers.



In Pole Position, you control a *grand prix* racing car, competing against computerized drivers in a race against the clock. You steer the car by pushing the joystick to the left or to the right. The fire button takes the place of the brakes. Push the joystick forward to put the car in low gear, and pull it back to shift to high.

As the Atari blimp passes overhead, you begin the game by attempting to qualify for the race. Your point of view is located at eye level, immediately behind your car. You slam down on the gas and begin to race along a realistic scrolling raceway with a mountain landscape in the background. You are now attaining speed (maximum 195 mph) and cruising along the straightaway. Pretty soon, you encounter a car just up ahead and you swerve to the right to pass it. Oh no! You lose control of your car and run off the track right smack into a billboard! Valuable seconds tick away while you get your car back onto the track to continue the race to the finish line. To qualify, you must place among the top eight cars (i.e., finish the lap in less than 74 seconds).

If you do manage to qualify, you are again placed at the starting line (according to how well you qualified) to begin the actual race. The race is identical to the qualifying run except that you must finish a certain number of laps, each within a certain amount of time.

Pole Position allows you to select up to four different courses: Atari Grand Prix, Malibu, Indianapolis, and Practice Run (no cars). You can also determine the number of laps for each race (up to eight) to increase the challenge of the game. Depressing the space bar momentarily pauses the game.

Pole Position's graphics are exceptionally well done. The cars are multicolored and the mountain landscape is very realistic. The game's sounds are also excellent. You can hear the roar of the engines and the squealing of the tires. The many hairpin turns and dangerous obstacles make this a very difficult game.

Pole Position will challenge and entertain you for hours on end, and I highly recommend it.

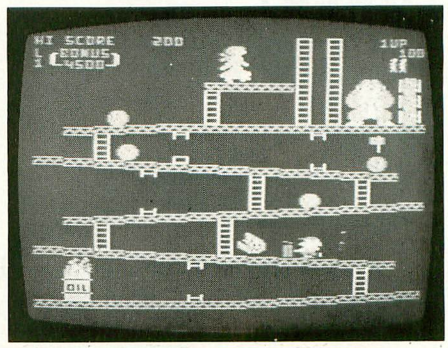
DONKEY KONG

Atari, Inc.
P.O. Box 427
Sunnyvale, CA 94086
(408) 745-2000
$49.95, 16K — cartridge

Reviewed by George Adamson

Why did Atari wait until a year after Donkey Kong peaked in popularity to release its 16K ROM cartridge version of the game? Colecovision muscled into the home video market in 1982 on the shoulders of the oversized ape, with resolution surpassing anything on the home market. True arcade fans were quick to note how far short "Kong" fell, however.

Though a latecomer, Atari's **Donkey Kong** is just about the most faithful reproduction of an arcade game that we've seen for home use. All versions of Kong challenge Mario, the carpenter, to rescue his lady love from the clutches of the giant gorilla who seeks sanctuary higher and higher atop an unfinished skyscraper. But it's the attention to detail that sets the Atari version apart from its



cousins — from Kong baring his teeth and shaking his fists to the "halo" above Mario when he gets clobbered (as he inevitably will).

The first screen finds Kong at the top of the lowest structure, heaving barrels in all directions. Not only does Mario have to jump rolling barrels, but he has to beware of barrels falling vertically. On higher levels Kong even tosses barrels diagonally. On Colecovision the barrels just roll off the screen, but on Atari they crash into the burning oil drum (animated in the Atari game) and turn into deadly foxfires that seek Mario out.

The "rivet" board is designed differently from Colecovision, having five rows of girders and ten rivets to be popped out (Coleco had eight). There is plenty of animation as the girl darts from side to side, and Kong stomps and snorts. If all rivets are removed, Kong falls on his head.

continued on next page

The elevator sequence really gets wild as Mario must not only time his jumps to avoid falling or being singed by foxfires, but he most dodge the mad "springies" to reach his goal.

Colecovision may have an edge in resolution, but Atari's Kong is more ferocious looking, and his grunts sound worse than an 810 disk drive. Atari players see the girl scream "Help!" They see Mario's heart glow when he reaches the girl, and split in half when she disappears. Just like the arcade original, the Atari version asks the question, "How high can you go?' and stacks Kongs after each board has been conquered. And yes, fans, Atari does have the fourth screen with the conveyor belts.

Atari displays the high score attained during the session. If you've mastered Colecovision and expect to manhandle Atari's Kong, are you in for a surprise! My son racked up 380,000 on Colecovision but only about 80,000 on Atari. I could reach the third board on Colecovision, but I found even that to be a rare accomplishment on the Atari version. Each screen has so many actions and so many variables that the game just doesn't get monotonous.

Move over, Pac-Man. Atari has a really "heavyweight" champ!

TWO FROM PARKER BROTHERS

Q*BERT

Parker Brothers
50 Dunham Rd.
Beverly, MA 01915
(617) 927-7600
$39.95, 8K — cartridge

Reviewed by David Duberman

. . . When I regained consciousness, I found myself atop a pyramid of enormous blocks. I had somehow been transformed into an unsightly kiwi-like little creature, more nose than anything. But oh, I could leap! One hop would carry me to the top surface of any adjacent cube one row up or down. Soon I found that I could make apparent progress merely by changing the top surface of each block in the pyramid to a certain color. The color was indicated to me by a flag that appeared in a cloud. This I accomplished by leaping onto and off of each block a certain number of times, the number depending on how far along in the sequence I was. At this, a peal of chimes would sound in the distance, and I would find myself at the top of a fresh pyramid. So I had found a purpose in life, of sorts, and was content . . .

If you arcade freaks recognize the scenario of **Q*Bert**, let me add that Parker Brothers has produced here one of the finest translations of an arcade game for the home computer format. Everything is replicated — all the familiar enemies and the friendly Green Ball, even the whirling flying discs stationed at the pyramid's edge. About the only thing missing is the sound of Q*Bert's mumbled curses when he drops off the edge or encounters an enemy. You still see the cartoon balloon, though.

The enemies are all cute, but deadly. Red Ball and Purple Ball bounce downwards and squash you if contacted. If Purple Ball reaches the bottom, it turns into Coily, the snake, and pursues you mercilessly about the pyramid. Ugg and Wrongway appear out of nowhere and jump sideways and upwards. Sam bounces downwards and attempts to undo your work, changing blocks back to their original color. Only Green Ball helps you — touch it and all the enemies are frozen momentarily.

At higher levels, changing all the blocks to the correct color can be exceedingly difficult without a specific strategy. This is because once a block has become the target color, additional contact causes it to change to the original or an intermediate color, often necessitating numerous retracings of your path.

Q*Bert is a fascinating game to play. The feeling of realism created by the play mechanic is uncanny. After playing for a few minutes, you actually start to believe you're bouncing around on a three-dimensional pile of blocks. It's a truly great game, and I think the reason is that you hardly ever lose a life through bad luck, and you know it. You'll usually see a way you could have avoided disaster. If you had only . . .

SUPER COBRA

Parker Brothers
50 Dunham Rd.
Beverly, MA 01915
(617) 927-7600
$39.95, 8K — cartridge

Reviewed by David Plotkin

There are a number of classic video arcade titles that have never been released in the home computer format. One of the best of these, **Super Cobra**, is now available on cartridge from Parker Brothers. The game is very well done, with good playability and graphics; Parker Brothers' high standards in board games have evidently been carried over to its home computer games.

Super Cobra is a left-to-right scrolling game similar to Scramble. You pilot a heavily armed helicopter with your joystick. You must navigate through caverns and across hostile landscapes fairly bristling with missiles, tanks, and other obstacles. Your goal is to get through all ten of the thousand-mile segments and steal the treasure chest at the end. If you succeed, you start over at a higher difficulty level.

The hazards in Super Cobra are many. Missiles are launched upwards to shoot you down, tanks fire, and stationary and moving mid-air projectiles block your way. You must also destroy fuel dumps

or risk running out of fuel. Probably your most difficult task, however, is to navigate through some very tight spots in the caverns. The screen is in constant motion. You can advance your helicopter to about the center of the screen or back off to the left edge of the screen, but you can't stop. You start with five choppers, and a new one is awarded periodically.

Your helicopter's weapons are activated by pressing the fire button: bombs drop in a forward lob and guns fire forward. As many as four missiles can appear on the screen at once. You can destroy only enemy installations with your weapons — the ground and cavern walls are impervious.

Super Cobra makes excellent use of the Atari's special features, such as Player/Missiles, smooth scrolling and redefined character sets. The graphics are sharp and colorful. Clearly, here is a company that comprehends the difference between the VCS and the home computers. I look forward to more of their releases.

COMBAT LEADER

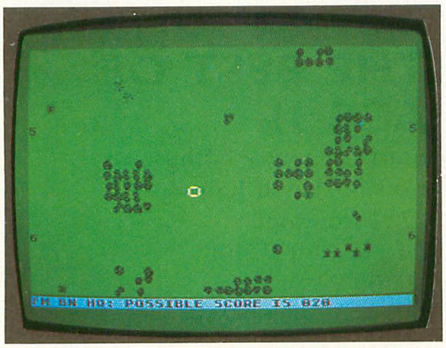
Strategic Simulations, Inc.
883 Stierlin Rd., Bldg. A-200
Mountain View, CA 94043
(800) 772-3545, ext. 335 (inside CA)
(800) 227-1617, ext. 335 (outside CA)
$39.95, 48K — cassette or disk

Reviewed by Edward Bever

Combat Leader, SSI's latest release in its "Rapid Fire" series, puts you in command of a mechanized squad, platoon, or company. You direct the movements of tanks, armored personnel carriers, and infantry fire teams across a scrolling landscape of hills, woods, rocks, and depressions. The computer controls the enemy forces, which flicker in and out of view as they enter and leave your troops' line of sight. The weapons available include rifles, machine-guns, anti-tank guns and missiles, mortars, and tank cannons. To win, you must maneuver your forces to make optimum use of their weaponry while avoiding enemy fire. The program includes six scenarios, in addition to which you may design your own.

Despite certain simplifications and inaccuracies concerning armament organization, Combat Leader achieves a fundamental form of realism: it recreates the feel of the situation it simulates and gives you a sense of the uncertainties and imperatives of modern tactical combat. In order to survive and prevail you must employ tactics similar to those used on the real battlefield.

Combat Leader is by no means simple to master, but it is a pleasure to play. The graphics are excellent, the machine



language program executes instantaneously, and the two-keystroke commands are easy to learn and employ. Units are often difficult to distinguish and it is not uncommon to issue the wrong commands, but these difficulties are probably intentional. Combat is inherently confusing, and one of the biggest problems with board and early computer war games was the unrealistic amount of information a player had about the enemy. Combat Leader recreates some of the chaos of tactical combat in a way that does not really make the game any more difficult to play, just more difficult to win.

Combat Leader is not the definitive simulation of modern tactical warfare, but it is an engrossing and enlightening game. I recommend it highly to all war gamers and to anyone else who enjoys a fast paced, challenging battle of wits and reflexes. *continued on next page*

MOUNTAIN KING

CBS Software
601 Doremus Ave.
Newark, NJ 07105
$39.95, 8K — cartridge

Reviewed by Bryan Welch

Deep inside a long-lost diamond mine lies the priceless crown of a long-lost civilization, awaiting an explorer courageous enough to take it. In **Mountain King**, your challenge is to seize the crown and escape with it to the top of the mountain, where you will be proclaimed (trumpet fanfare, please) Mountain King!



The graphics in Mountain King are not breathtaking, but are used cleverly enough to suggest the inside of a mountain, with a mystical touch.

Your first goal is to collect 1000 "diamond points," by jumping from ledge to ledge, picking up diamonds along the way.

Once you have reached this goal, you must locate the Flame Spirit. Don't try to find it on the screen, as it is almost invisible. Ignore the screen and listen for the theme music. The louder the music, the closer you are to the Flame Spirit. When you feel you are at the spot where the music's volume is at its peak, use your flashlight to find and capture the Flame Spirit.

Offer the Flame Spirit to the spirit guarding the temple, and it will allow you to enter and take the crown. This, however, is just the beginning of the battle, as now you have only 45 seconds to climb back up to the top of the mountain!

The main quality that makes Mountain King a winner is its music. As you race to the top of the mountain with the crown, the theme song plays with driving urgency, pushing you to climb faster and faster to reach the top in time. When you near the peak, the music plays at a frantic pace, causing you to make mistakes as you try to climb too quickly. The driving force of the music is impossible to ignore, and the overall effect is riveting. Many games have theme music, but in no instance has a game used music as so integral an element.

Mountain King is an outstanding game with an original idea and a tinge of mystery. If you like arcade-type games with fantastic music, then Mountain King is for you.

THE BEST OF ACE #1

Atari Computer Enthusiasts
c/o Chuck and Judy Ross
2222 Ironwood
Eugene, OR 97401
$15.00
16K — cassette, 24K — diskette

Reviewed by Fred Pinho

The Atari Computer Enthusiasts (ACE) is one of the oldest and best known of the many users groups. Their monthly newsletter enjoys world-wide distribution, and carries a variety of reviews, "hot" news and high-quality games and utilities. Many of the games make extensive use of machine language for "arcade" action. **The Best of ACE #1** is a collection of games and utilities from their early 1983 newsletters. Available on disk or cassette, the package has a variety of games with good graphics and sound.

As with much public-domain software, documentation is minimal, so you must experiment to discover all the features of each program. Some additional documentation plus a wealth of reviews and news can be obtained by ordering the ACE back issues (February through March 1983). These cost $2 each and are well worth the price.

Following is a brief description of the best games and utilities in the package, along with some hints on requirements for each.

Crickets (24K BASIC) is a Frogger-type game, with cute graphics and sound, in which a male cricket must bring gifts to his love waiting on the other side. He must jump from conveyor to conveyor, avoiding any objects on them and objects thrown by a jealous suitor. He then must turn around and get another gift.

Wild West is modeled on Activision's Kaboom. Dynamite Dan is dropping bombs on you. Move a sombrero with your paddle to catch them before they explode. The graphics, while simple, are colorful, and the action at the higher difficulty levels is fast and furious.

Old MacDonald is a delightful game for young children. It is designed to help them learn to count and match groups or patterns. A correct choice rewards them with a "smiley" and a little tune. An incorrect choice results in a "frowner." Getting ten smileys results in the full tune of Old MacDonald being played. Beautiful character graphics are used to display the animals to be counted or matched. An easy-to-use menu lets the child choose setup conditions. All three of these games were written by Stan Ockers, an "ace" programmer.

Also included is a GTIA joystick painting program, by Scott Berfield, which allows you to draw detailed pictures in any of the GTIA modes and save your pictures to disk or to a printer (Microprism or Epson MX80). Included are two picture files, including a beautiful drawing of the space shuttle. The BASIC program is not fully userproofed (you can cause errors to occur), but it has great power.

If you're adventurous and willing to experiment, the programs in this disk will give you an exposure to a variety of games and a great utility at a minimal price. Overall I rate this a software "best buy."

continued on page 128

IF YOU HAVE THE ATARI, WE HAVE THE PRINTERS.

GP-700AT
Full Color Printer — $599.

COLOR — is the big feature of our GP-700AT Atari direct-connect printer. It's fast, quiet and the bright colors will make any presentation come alive. We provide cable and screen dump programs to eliminate any installation problems. 850 interface is NOT required, even if you daisy-chain a disk drive or cassette recorder. You can print, plot and screen dump in 25 colors with Axiom's GP-700AT.

GP-550AT
Dual Mode Printer — $399.

QUALITY — is the keynote in our near letter quality mode with a density normally costing twice as much. You get friction, fully adjustable tractors, and even bottom feed for label printing. 850 interface is NOT required. We supply cable, manual and screen dump programs to get you off to a flying start. You can even daisy-chain a disk drive or cassette with the GP-100AT Atari direct-connect printer.

GP-100AT
Economical Printer — $299.

COST — is small but features are many. You get graphics and adjustable tractors. Uses full size standard fan-fold paper. Just take it home, plug it in and you'll be printing in minutes. The GP-100AT Atari direct-connect printer comes with screen dump to provide spectacular graphics, and you can daisy-chain other peripherals. Again, NO 850 interface is required.

AT-WORDSTORE
Printer Buffer — $299.

EFFICIENCY — is what you get with our 32K printer buffer. Features include pause and copy. WORDSTORE can be connected to Atari computers WITHOUT an 850 interface. Other peripherals can be daisy-chained. Accepts any Centronics-parallel input printer. Two year warranty. Best of all, WORDSTORE is priced well below other printer buffers.

AT-846
Expansion Interface — $99.

SIMPLICITY — it's just like Atari's 850 interface, but without the four funny serial ports. Great for interfacing any parallel printer to your Atari computer. Can daisy-chain other peripherals, too. By the way, if you think up a name for this product, drop us a line. If we use it, we'll send you a color printer free. Contest ends 12-31-83.

AXIOM®
AXIOM CORPORATION
1014 Griswold Avenue
San Fernando, CA 91340
(213) 365-9521 • TWX: 910-496-1746



DOS-MOD

Eclipse Software
1058 Marigold Ct.
Sunnyvale, CA 94806
(408) 246-8325
$35.00, 16K — disk (single density)
$50.00, 16K — disk (double density)

Reviewed by Larry Dziegielewski

DOS-MOD is an Atari Disk Operating System (DOS) enhancement which gives the user a more powerful, easier to use DOS. It fixes all of the known bugs in Atari DOS, and adds many advanced features usually found only in systems running on much larger machines. Until now, Atari Disk Drive owners have had DOS 2.0 or OSA + to handle their disk I/O chores. While Atari DOS is good, it has a few areas which could stand improvement. This is where DOS-MOD steps in.

DOS-MOD is packed with features, including three new commands.

The P (run program) command begins execution of a program in memory. The P command differs from the M command in the default address used to begin execution. With M, when no address is specified, the address of the last loaded binary file is used. With P you can specify the default address by typing P [hex address]. As an example, programmers could use P to access a debugging file already in memory, work in that file, and then switch back to DOS.

The Q (command file) command creates a file of DOS commands that can be executed later with a single line command. This can greatly simplify the implementation of commonly used commands by grouping them into one or more files.

The R (read/store memory) command can be used to examine and change hex addresses in memory. In response to the command R [hex address], DOS will print the requested address and display the eight bytes of data starting at that memory location. Typing S will repeat the action and allow you to type in new

hex values for that address. Pressing [RETURN] stores the new values.

DOS-MOD also comes in a double-density (DD) version which is compatible with most standard DD formats that understand the Percom protocols. The DD version has a few added features not found in the SD version. The L command now has a /M option which when executed will display the hex locations of the memory areas loaded. Using this option you can see which areas of memory are occupied by a binary file. There is also a HELLO command file option which is executed automatically each time you boot DOS. With the HELLO file, you can put in any message, including any DOS commands needed to set up your system to suit your needs. This is a most useful feature. Lastly, the DD version has a cartridge-bypass feature, which lets you bypass any installed cartridge when booting and go right to the DOS menu. The DD version can also run in the SD mode.

DOS-MOD has one of the best tutorials I have seen in a long time. It guides you step by step through the program features, encouraging you to try out the new commands as you go along. The tutorial is fairly lengthy. When dumped to a printer, the text fills 48 sheets of printer paper. It should be noted that DOS-MOD comes without a manual, only a command summary booklet. Therefore, it is necessary to keep a copy of the printout on hand for detailed information.

DOS-MOD is fast, easy to use, and is extremely powerful, but most of all, a bargain. In my opinion, the tutorial alone is worth the purchase price, making DOS-MOD a best buy at the software market.

HOME-CALC

Sim Computer Products
1100 E. Hector St.
Whitemarsh, PA 19428
(215) 825-4250
$29.95, 16K — tape
$39.95, 24K — disk

Reviewed by Jordan Powell

Home-Calc is an inexpensive spreadsheet program well suited for use in the home. **VisiCalc**, the only other spreadsheet available for the Atari, is expensive and contains features not needed for home application.

The program comes with a special key which must be inserted into joystick Port 1. BASIC is also required.

Once the program is loaded, it checks the amount of memory it has to work with and then calculates the number of cells available to you. A cell is a position on the spreadsheet in which you can put the numbers you are working with, or column and row labels. You are then asked how you want to arrange the number of cells available (how many rows by how many columns). Alphabetic labels, numbers and formulas can be entered into the cells. Formulas allow you to use the contents of one or more cells to calculate the contents of another cell. You can enter formulas using the four basic arithmetic operations and exponentiation. There is also a "sum" function which will add up any row, column or block of cells. To move to different parts of the spreadsheet, you can use the arrow keys or the GOTO command for rapid repositioning.

The disk version of the program permits replication of the contents of a cell in another cell or block of cells. Templates, which are forms where the relationships between cells, their values and labels are stored, can be saved and loaded in both versions and the spreadsheets can be printed. The disk version also allows you to look at the disk directory while loading and saving templates.

In summary, Home-Calc is useful and well worth the money. The documentation is easily understood and the capabilities are adequate for home use. I use Home-Calc to do my family budget and other financial calculations and it saves me time and helps me to better analyze my finances.

LISTING CONVENTIONS

Table Information

Our custom font listings represent each ATASCII character as it appears on the video screen. You generate some characters by a single keystroke, for example, the regular alphabet. Others require a combination or sequence of keystrokes. In this table, ESC means *press and release* the escape key before pressing another key. CTRL or SHIFT means *press and hold* the control or shift key while simultaneously pressing the following key.

The Atari logo key (人) "toggles" inverse video for all alphanumeric and punctuation characters. Press the logo key once to turn it on; press again to turn it off. In the XL line there is no logo key; inverse video is controlled by a key on the function row. Decimal values are given as reference, and correspond to the CHR$ values often used in BASIC listings.

NORMAL VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	CTRL ,	0
	CTRL A	1
	CTRL B	2
	CTRL C	3
	CTRL D	4
	CTRL E	5
	CTRL F	6
	CTRL G	7
	CTRL H	8
	CTRL I	9
	CTRL J	10
	CTRL K	11
	CTRL L	12
	CTRL M	13
	CTRL N	14
	CTRL O	15
	CTRL P	16
	CTRL Q	17
	CTRL R	18
	CTRL S	19
	CTRL T	20
	CTRL U	21
	CTRL V	22
	CTRL W	23
	CTRL X	24
	CTRL Y	25
	CTRL Z	26
	ESC ESC	27
	ESC CTRL −	28
	ESC CTRL =	29
	ESC CTRL +	30
	ESC CTRL *	31
	CTRL .	96
	CTRL ;	123
|	SHIFT =	124
	ESC SHIFT CLEAR	125
	ESC DELETE	126
	ESC TAB	127

INVERSE VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	人CTRL ,	128
	人CTRL A	129
	人CTRL B	130
	人CTRL C	131
	人CTRL D	132
	人CTRL E	133
	人CTRL F	134
	人CTRL G	135
	人CTRL H	136
	人CTRL I	137
	人CTRL J	138
	人CTRL K	139
	人CTRL L	140
	人CTRL M	141
	人CTRL N	142
	人CTRL O	143
	人CTRL P	144
	人CTRL Q	145
	人CTRL R	146
	人CTRL S	147
	人CTRL T	148
	人CTRL U	149
	人CTRL V	150
	人CTRL W	151
	人CTRL X	152
	人CTRL Y	153
	人CTRL Z	154
	ESC SHIFT DELETE	156
	ESC SHIFT INSERT	157
	ESC CTRL TAB	158
	ESC SHIFT TAB	159
	人CTRL .	224
	人CTRL ;	251
	人SHIFT =	252
	ESC CTRL 2	253
	ESC CTRL DELETE	254
	ESC CTRL INSERT	255

Tangle Angles

by CARL EVANS

I'm yet another new Atari owner who's been plagued by CLOAD errors from my 410. So, armed with the April 1983 issue of ANTIC, I decided to do something about it. I added several test points to determine where the failure was occurring. As a result, I found that the data-out line had an excessive amount of jitter when viewed on a dual-trace oscilloscope along with the output of the active filters.

I decided to modify the diode/RC networks between the active filters and the comparator as a possible cure, after checking the DC regulator to the motor drive for ripple. Since performing this modification, I've had no CLOAD errors!

While this modification isn't substantially more difficult than the resistor-replacement mod you recommend, the alignment does require test equipment that is not found in the average home. However, any competent stereo-service shop should be able to complete the alignment in considerably less than an hour's time.

Stephen Matern
Vice-President
Bonneville Atari Group (BAG)
Moses Lake, WA

I'm pleased to see that we have so many inventive Atari users out there. I tried your mod, and it works. In essence, you installed a notch filter in the digital-playback circuit to eliminate the overlap between the two tuned filters. This prevents the occasional cross-over you can get with these circuits. My hi-rel mod accomplishes the same thing by tightening the skirts on the response curves. Your solution is a very good one for people who have the proper lab equipment. I suggest that you write a short how-to article about your modification that we can publish in this department of ANTIC.

I'm writing for two reasons. First, I'm very curious about the history of the 410 recorder. I have what I call an "old" 410, which is larger than the "new" 410 and has a tape counter on the lower right of the tape compartment, rather than the upper left. Several of my friends have the new 410's, and this has brought the differences between the two models to my attention. When we exchange programs, my friends often have problems loading programs recorded on my old 410. Furthermore, my old 410 can often load programs that were recorded on the new units, even when the "parent" recorder fails to do so. Why the difference between the two models, and why did Atari switch from a reliable recorder to a loser?

I'm also curious about the "hi-rel mod" you've mentioned in several columns.

Rod Smith
Cincinnati, OH

The hi-rel modification is very simple. All you need to do is replace the 10% resistors in the tuned filters with a tighter tolerance pair of resistors. I recommend 1% resistors, but anything smaller than 10% will give you some improvement (by the way, Atari went with 5% resistors in the later-model 410's and 1010's). Since I did my first column on this subject, I've been given a copy of the recorder-troubleshooting manual that Atari sends to its service centers. The resistor I.D. numbers you need are R110 (330K, ¼ watt) and R114 (240K, ½ watt). These codes should be printed on the circuit board next to the resistors.

I've never actually seen one of the 1979-vintage 410 recorders (your "old" 410). I first saw a 410 in 1981, and have since seen at least three versions that are called "410 recorders." Check the tolerance of the resistors in your recorder. It's possible that Atari used better components than 10% resistors in the early models. At any rate, try my hi-rel mod on your friends' recorders; I'm sure they will see an immediate improvement.

I read somewhere recently about the problems involved in using cassette recorders to make backup copies of tapes, so I tried it myself. I put a boot cassette on my stereo cassette deck, copied it to my reel-to-reel deck (at 7½ ips) and then copied it back to my cassette deck.

So far, my success rate with this procedure is running about 95 percent. The only problem is that when I try to put more than one program on one side of a tape, I'm never able to load the second program. As soon as I get past the first program, the recorder acts as if there's bad data on the tape and gives me an error message. I've listed to the tape on a cassette recorder and I'm sure that nothing is there. Any ideas?

C.J. Cottle
East Haven, CT

Analog copying of cassettes is, at best, a tricky business. If you have a good audio tape deck and you put just one program on a tape, you will usually get reasonably good results. The trick to putting more than one program on a side is timing. The Atari tape recording process is extremely time dependent. The second file should load properly if you find the right spot on the tape to start

continued on next page

the load. This is tricky, even with files written entirely by your computer. Good luck!

Being new to Atari and to ANTIC, I may be beating a dead horse, but do you know of any adapter that permits the use of non-Atari tape units with the Atari 400?

Aaron G. Todd, Jr.
Los Angeles, CA

There are at least three products on the market that claim to let you use a "normal" stereo recorder with your computer. I say "claim to" because I have not actually tested any of these devices. As a result, I cannot recommend any of them personally. I will, however, refer you to several ads I noticed in the August 1983 issue of ANTIC. On page 75, the EFD 600 from Essence Peripheral Systems is advertised, and there's an ad on page 99 for the Casadapter from SAR-AN Computer Products. I'm sure that other such devices are also available. If you purchase one of them, please let me know how it works so I can pass the information on to our fellow cassette users.

Is there a way to compare cassette size (tape length) to program size (RAM)? For example, does a 48K program require a C30 cassette?

R.M. Kirby
Chifley, Australia

A program's size is normally defined in terms of how much RAM it requires. To get a feel for the tape length to use for programs that appear in magazines, for example, check the number of K-bytes of RAM required and use this little formula to determine how much tape you need:

LENGTH=(K-BYTES)(5 MINUTES) /(8 K-BYTES)*

It takes approximately five minutes to load an eight K-byte program, and about 20 minutes to load a 32 K-byte program. I suggest that you time the loading of different programs on your computer and define your own conversion factor. Don't forget to take the 20-second leader into account.



That's right — anything can happen, and it usually does! Because, with a Scott Adams Adventure, the fantastic is as close as your computer and your own imagination. From mysterious castles to nuclear reactors, from ghost towns to strange new worlds, the thirteen Scott Adams Adventures will provide you with hours of fascinating Adventuring.

Adventures come two ways: text and graphic. Text versions are available on the Atari [400/600/800/1200], TI 99/4A, Vic-20, Commodore 64, Radio Shack Color Computer, Northstar Horizon & Advantage, TRS-80 Model I, II, III, & IV, and Z-80 8" CP/M.

The S.A.G.A. [Scott Adams Graphic Adventure] Series features the finest in high resolution graphics and is compatible with the VOTRAX voice synthesizer. Expand your Adventuring horizons with wonderful graphics and Adventures that talk! S.A.G.A.s are available on the Atari, Apple and the Commodore 64.

Visit your local dealer today and see the Scott Adams Adventures from Adventure International - The Company That Started It All!

Now! Adventure 13!

Long ago, in times passed beyond remembrance, Solon the Master Wizard and wearer of the Secret Cloak lost the 13 Stars of Power. The grasping Vileroth believed the Stars to be the only source of Solon's expert wizardry. But, unbeknownst to Vileroth, it was the Secret Cloak that controlled the Stars and protected the wearer from their awesome power. Unable to master the Stars, Vileroth was undone.

In his final days, as Vileroth's strength slipped from him, he concealed the 13 Stars of Power within the Castle of Claymorgue, determined that no one save he should possess them. Solon, learning of Vileroth's destruction, dispatched his faithful young apprentice Beanwick to retrieve the Stars.

"Tread carefully, O Beanwick! Would that I could assume this quest myself, but alas, I can only send with you these few spells. Claymorgue Castle harbors further spells, but beware - one unskilled in the magical arts cannot predict their outcome."

Adventure® INTERNATIONAL
A DIVISION OF SCOTT ADAMS, INC.
BOX 3435 • LONGWOOD, FL 32750 • (305) 862-6917

Visit your local dealer today, or call us at

1-800-327-7172

163

microscreens



Interest in creating art with Atari computers is increasing, as the stream of submissions for Microscreens shows. This month we feature three very different styles.

Scott Berfield gets top billing for his "Shuttle Landing" executed with his own graphics utility, **GTIA Sketchpad**, which we present on page 137.



The cartoonlike drawing and unusual colors of "Journey" make Stanley Dewan's picture fun to look at. The image derives from the ride-through attraction at Disney World called "Journey into Imagination" and was also done with **Micro-Painter**.



"Innocence," by Chyrene Pendleton, is one of several pieces we have liked from her, and demonstrates the effectiveness of subtlety. She used **Micro-Painter** to create it.

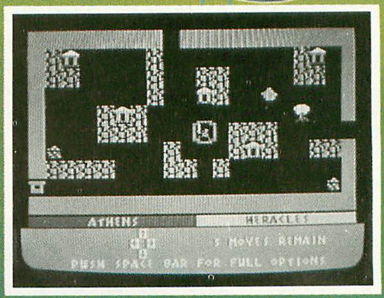
The computer adventure you've been waiting for...

THE RETURN OF HERACLES™

An exploration of Greek mythology translated into modern electronics
by Stuart Smith

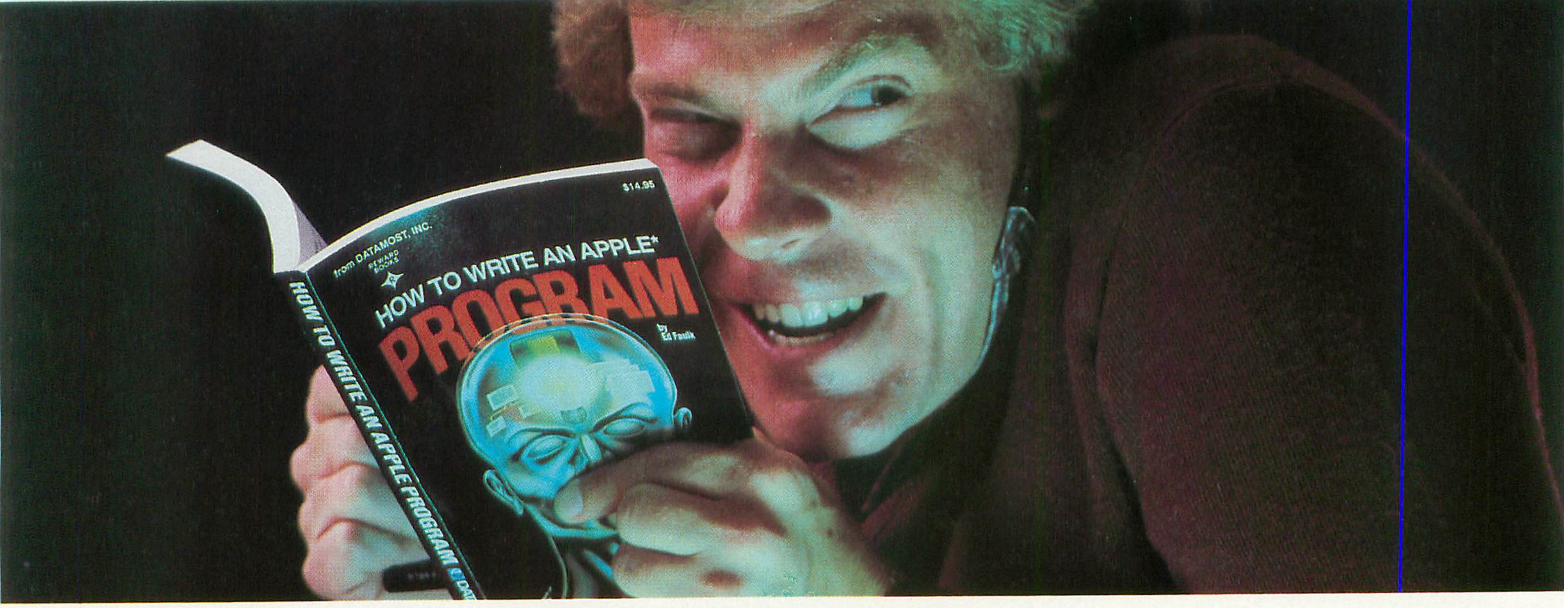


The creative mind of Stuart Smith, author of ***Ali Baba and the Forty Thieves,*** brings to life the world of mythic Greece in fantastic color and sound! Carefully researched and skillfully programmed, ***Return of Heracles*** is computer entertainment at its best. Twelve difficult and dangerous tasks will be assigned to you by Zeus, and your heroes must accomplish them all. One or more players take on the role of an ancient Greek hero or heroine. There are 19 heroes to choose from, or choose them all! May the gods favor you!



For Atari home computers.
On diskette. Requires 48K
$32.95

QS QUALITY SOFTWARE
6660 Reseda Blvd., Suite 105, Reseda, CA 91335
(213) 344-6599



Outsmart your computer.

Show your computer who's boss. Earn its respect. With a Datamost book.

No matter what age or ability level you're at, we have the right book that talks just to you. And your computer. Whether you own an Apple.* An Atari.* Or just about any brand.

All our books are incredibly easy to understand.

Which will make it incredibly easy to understand your computer.

What If You're Scared Of Books About Computers?

Don't be.

Our books are written in friendly, familiar American English. Highlighted with cartoons. And illustrations. So they're fun to read. As well as educational.

And there's over 30 books to choose from. Basic computer learning books to programming books to coloring books.

You won't be bombarded with complicated programming routines until you're ready for complicated programming routines. And no funny technical talk until you've reached the level where you don't think it's funny.

We'll tell you what you need to know. And then, when that's understood, you can take the next step toward outsmarting your computer.

Before You Spend Big Bucks On A Computer, Spend Little Bucks.

Once you've decided, kind of, almost, nearly, what type of computer you think you'd like to buy, buy a Datamost book.

It'll help you understand the Atari or the Commodore* or the Apple of your eye.

Before you spend a lot of money. Before you take your computer home.

You'll make a better purchase decision. Because you'll understand what you're doing. And what you and your computer can do together.

So there won't be any misunderstandings to ruin your new relationship.

How To Get The Most Out Of Your Computer.

Get the most out of our minds.

Datamost books for every computer.

Everybody. Every level.

Pretty smart, huh?

DATAMOST™ INC

The most out of our minds.™

Datamost, Inc., 8943 Fullbright Ave., Chatsworth, CA 91311, (213) 709-1202
*Atari is a trademark of Atari Computer.*Apple is a trademark of Apple Computer.
*Commodore 64 is a trademark of Commodore Business Machines, Inc.



GTIA SKETCHPAD

Graphics utility for Modes 9, 10, and 11

by SCOTT BERFIELD

GTIA Sketchpad is a drawing program for Graphics Modes 9, 10, and 11. With it you can create pictures of up to sixteen colors using simple commands and a joystick. You can save and retrieve your compositions on tape or disk and even make a printout if you have an Epson printer with *Graftrax*. I wrote this program because I wanted to take advantage of the GTIA capabilities but none of the drawing packages on the market were written for the new modes.

PROGRAM OPERATION

After a brief blanking of the screen you will be presented with a menu of the modes available. For purposes of experimentation, type "1" to set up Mode 9. You are now asked for a background color. This is a number from 0 to 15 corresponding to the Atari color set:

0	Black	8	Light Blue
1	Gold	9	Blue Green
2	Orange	10	Aqua
3	Red	11	Green Blue
4	Pink	12	Green
5	Violet	13	Yellow Green
6	Indigo	14	Orange Green
7	Blue	15	Orange

Type 0 for a black background and you will see the basic screen setup. At the bottom there is a text window. Above this there is a color bar which ranges from black to white. Finally, there is a flashing dot in the center of the screen.

Look at the text window. You will see the following: "Point, Line, Doodle, Box, Circle, Fill, Whole screen, Save, Retrieve, Hardcopy, New, Quit."

To select any of the above, press the letter which is highlighted in inverse video and follow the instructions that appear. For example, press [B] and you will be asked to position the cursor to one corner and press the trigger, then move to the opposite corner and press the trigger again. If you did this and nothing happened, it is because you drew a black box on a black background. To choose a different color, press either of the arrow keys. The marker under the color bar will move correspondingly. All of the commands work in similar ways. When plotting points or drawing lines, or when you use the "doodle mode," you will stay in that command mode until you press [ESC]. You can exit any command by pressing [ESC] at any time, and you can change color at any time. When drawing circles, you will be prompted for a correction factor. This ranges from 1.0 to 0.270 and allows you to correct for the normally skewed shapes of the pixels. 1.0 will draw an ellipse, while 0.270 will draw a circle. "Fill" will fill with the fill-color any area that is *completely* bounded.

[W], for Whole Screen, will fill the drawing area with the current color. To erase your drawing, use [W] with the background color. To stop the whole-screen fill at any point, press [ESC].

To save a copy of your artwork, press [S] and answer the prompt with "C:" for cassette or "D:filename" for disk. When the file is saved, you will see the options menu appear in the text window. To retrieve the file, press [R] and follow the same procedure. Pressing [E] will cancel the command.

[H] will allow you to create a printout of your screen on an Epson MX-80 with *Graftrax*. You have a choice of two types of printout: a random dot pattern or a fixed pattern. While this is a matter of taste, if you are in a hurry use the faster, patterned version.

Should you somehow crash the program, you can re-enter it without losing your picture by typing "GOTO 40" in BASIC's direct mode.

All of the above commands are the same for all three modes (9, 10, and 11). The only difference among modes is seen in the setup. If you use Mode 10, you will be prompted for color, and for the luminance of each of nine colors. The color is a number from the previously-listed chart, and luminance is a number from 0 to 15, with 0 being the darkest. Mode 11 will prompt you for the luminance value at which all sixteen colors will be displayed, with 0 again being the darkest.

continued on next page

```
7 REM ***      GTIA SKETCHPAD         **
9 REM ***      SCOTT BERFIELD         **
10 REM **      ANTIC MAGAZINE         **
20 GRAPHICS 0:POKE 82,1:POKE 752,1
30 GOSUB 1520:GOSUB 1260
40 ? CHR$(125);CHOICE$;CHOICE1$:LOCATE
 XP,YP,VAL:COLOR C:PLOT XP,YP
50 OPT=PEEK(KEY):IF OPT<>NOKEY THEN PO
KE KEY,NOKEY:GOSUB 70
60 COLOR ABS(C-8):PLOT XP,YP:COLOR C:P
LOT XP,YP:COLOR VAL:PLOT XP,YP:GOTO 50
70 IF OPT=10 THEN GOTO 580
80 IF OPT=N0 THEN GOTO 620
90 IF OPT=58 THEN GOTO 660
100 IF OPT=21 THEN GOTO 840
110 IF OPT=18 THEN GOTO 880
120 IF OPT=56 THEN GOTO 210
130 IF OPT=62 THEN GOTO 1070
140 IF OPT=40 THEN GOTO 1130
150 IF OPT=47 THEN GOTO 1200
160 IF OPT=7 THEN GOTO 490
170 IF OPT=6 THEN GOTO 520
180 IF OPT=35 THEN GOTO 1200
185 IF OPT=57 THEN GOTO 30000:REM FOR
PRINTER DUMPING ONLY
190 IF OPT=46 THEN 1250
200 GOTO 50
210 ? CHR$(125);"PLACE CURSOR WITHIN T
HE OUTLINE AND     PRESS TRIGGER(ESC TO
 EXIT)."
214 TRAP 40
215 IF PEEK(KEY)=28 THEN POKE KEY,NOKE
Y:GOTO 40
220 GOSUB JOYSTICK
230 COLOR C
240 YP1=YP:LEFT=270:DOWN=320:FLAG=0:DF
LAG=0
250 FOR Q=XP TO 319-XP:LOCATE Q,YP,COL
R:IF COLR=C THEN GOTO LEFT
260 PLOT Q,YP:NEXT Q
270 FOR Q=XP-1 TO 1 STEP -1:LOCATE Q,Y
P,COLR:IF COLR=C THEN 290
280 PLOT Q,YP:NEXT Q
290 IF FLAG=1 THEN GOTO DOWN
300 YP=YP-1:LOCATE XP,YP,COLR:IF COLR=
C THEN FLAG=1:GOTO DOWN
310 GOTO 250
320 IF DFLAG=1 THEN 340
330 YP=YP1:DFLAG=1
340 YP=YP+1:LOCATE XP,YP,COLR:IF COLR=
C THEN GOTO 210
350 GOTO 250
360 TRAP 40000:GOTO 40
370 IF STRIG(N0)=N0 THEN COLOR C:RETUR
N
380 IF PEEK(KEY)=6 THEN POKE KEY,NOKEY
:GOSUB 520
390 IF PEEK(KEY)=7 THEN POKE KEY,NOKEY
:GOSUB 490
400 IF PEEK(KEY)=28 THEN POKE KEY,NOKE
Y:GOTO 40
410 OXP=XP:OYP=YP:OVAL=VAL
420 XP=XP+XD(STICK(N0)):YP=YP+YD(STICK
(N0))
430 IF XP>79 THEN XP=0
440 IF XP<0 THEN XP=79
450 IF YP>149 THEN YP=0
460 IF YP<0 THEN YP=149
470 LOCATE XP,YP,VAL:COLOR OVAL:PLOT O
XP,OYP
480 COLOR C:PLOT XP,YP:COLOR ABS(C-8):
PLOT XP,YP:COLOR VAL:PLOT XP,YP:GOTO 3
70
490 OB=B:OB1=OB+N1:OC=C:B=B+N2:C=C+N1:
IF C>CMAX THEN C=CMIN
500 IF B>BMAX THEN B=BMIN
510 GOTO 540
520 OB=B:OB1=OB+N1:OC=C:B=B-N2:C=C-N1:
IF C<CMIN THEN C=CMAX
530 IF B<BMIN THEN B=BMAX
540 COLOR OC:PLOT BAR(OB),159:DRAWTO B
AR(OB1),159
550 IF C<INT(0.5*CMAX)+N1 THEN COLOR C
MAX
560 IF C>=INT(0.5*CMAX)+N1 THEN COLOR
CMIN
570 PLOT BAR(B),159:DRAWTO BAR(B+N1),1
59:COLOR C:RETURN
580 ? CHR$(125);"POSITION CURSOR AND P
RESS TRIGGER TO    PLOT POINTS(ESC TO E
XIT)."
585 IF PEEK(KEY)=28 THEN POKE KEY,NOKE
Y:GOTO 40
590 GOSUB JOYSTICK
600 PLOT XP,YP
610 GOTO 580
620 ? CHR$(125);"POSITION CURSOR AND P
RESS TRIGGER TO    PLOT STARTING POINT(
ESC TO EXIT)."
630 GOSUB JOYSTICK:PLOT XP,YP:CXP=XP:C
YP=YP
640 ? CHR$(125);"NOW POSITION CURSOR A
T ENDPOINT AND     PRESS TRIGGER(ESC TO
 EXIT)."
650 GOSUB JOYSTICK:PLOT CXP,CYP:DRAWTO
 XP,YP
655 IF PEEK(KEY)=28 THEN POKE KEY,NOKE
Y:GOTO 40
656 GOTO 620
660 ? CHR$(125);"USE JOYSTICK TO DRAW,
 HOLD TRIGGER FOR A THICK LINE, PRESS
ESC TO EXIT TO MENU"
670 Z=PEEK(KEY):IF Z<>NOKEY THEN POKE
KEY,NOKEY
680 IF Z=6 THEN GOSUB 520
690 IF Z=7 THEN GOSUB 490
700 IF Z=28 THEN GOTO 40
710 IF STRIG(N0)=N0 THEN 770
720 XP=XP+XD(STICK(N0)):YP=YP+YD(STICK
(N0)):IF XP<N0 THEN XP=79
730 IF XP>XMAX THEN XP=N0
740 IF YP<N0 THEN YP=YMAX
750 IF YP>YMAX THEN YP=N0
760 COLOR ABS(C-CMAX):PLOT XP,YP:COLOR
 C:PLOT XP,YP:GOTO 670
770 IF STRIG(N0) THEN 670
780 XP=XP+XD(STICK(N0)):YP=YP+YD(STICK
(N0)):IF XP>78 THEN XP=N1
```

```
79Ø IF XP<N1 THEN XP=N1
8ØØ IF YP<N1 THEN XP=78
81Ø IF YP>148 THEN YP=N1
82Ø PLOT XP-N1,YP-N1:DRAWTO XP+N1,YP-N
1:PLOT XP+N1,YP:DRAWTO XP-N1,YP:PLOT X
P-N1,YP+N1:DRAWTO XP+N1,YP+N1
83Ø GOTO 77Ø
84Ø ? CHR$(125);"POSITION CURSOR TO LO
WER RIGHT CORNER OF BOX AND PRESS TRI
GGER."
85Ø GOSUB JOYSTICK:PLOT XP,YP:BX=XP:BY
=YP:? CHR$(125);"NOW POSITION TO UPPER
 LEFT AND PRESS    TRIGGER TO PLOT";
87Ø GOSUB JOYSTICK:PLOT XP,YP:DRAWTO B
X,YP:DRAWTO BX,BY:DRAWTO XP,BY:DRAWTO
XP,YP:GOTO 4Ø
88Ø TRAP 88Ø:? CHR$(125);"ENTER ROUNDN
ESS(1=3 TO 1 ELLIPSE, .275=ROUND)";:IN
PUT SCALE
89Ø ? "NOW PLACE THE CURSOR AT THE CEN
TER OF  THE CIRCLE AND PRESS THE TRIGG
ER.":GOSUB JOYSTICK:XC=XP:YC=YP
9ØØ ? CHR$(125);"NOW POSITION THE CURS
OR TO A POINT ON  THE CIRCUMFERANCE OF
 THE CIRCLE AND    PRESS THE TRIGGER."
91Ø GOSUB JOYSTICK:XR=XP:YR=YP:IF XC>X
R THEN XD=XC-XR
92Ø IF XC>XR THEN XD=XC-XR:GOTO 94Ø
93Ø XD=XR-XC
94Ø IF YC>YR THEN YD=YC-YR:GOTO 96Ø
95Ø YD=YR-YC
96Ø IF XC=XR THEN R=YD:GOTO 99Ø
97Ø IF YC=YR THEN R=XD:GOTO 99Ø
98Ø R=SQR((XD*XD)+(YD*YD))
99Ø X=Ø:Y=R:DIAMETER=3-2*R
1ØØØ IF X<=Y THEN GOSUB 1Ø4Ø:IF DIAMET
ER<Ø THEN DIAMETER=DIAMETER+4*X+6:X=X+
1:GOTO 1ØØØ
1Ø1Ø IF X>Y THEN TRAP 4ØØØØ:GOTO 4Ø
1Ø2Ø DIAMETER=DIAMETER+4*(X-Y)+1Ø
1Ø3Ø Y=Y-1:X=X+1:GOTO 1ØØØ
1Ø4Ø TRAP 1Ø6Ø:PLOT XC+(X*SCALE),YC+Y:
PLOT XC+(Y*SCALE),YC+X:PLOT XC+(Y*SCAL
E),YC-X:PLOT XC+(X*SCALE),YC-Y
1Ø5Ø PLOT XC-(X*SCALE),YC-Y:PLOT XC-(Y
*SCALE),YC-X:PLOT XC-(Y*SCALE),YC+X:PL
OT XC-(X*SCALE),YC+Y
1Ø6Ø RETURN
1Ø7Ø TRAP 1Ø7Ø:? CHR$(125);"INPUT FILE
 NAME (E TO EXIT).":INPUT FILE$:IF FIL
E$(1,1)="E" THEN TRAP 4ØØØØ:GOTO 4Ø
1Ø8Ø OPEN #N1,8,128,FILE$
1Ø9Ø RTOP=256*PEEK(1Ø6):BASE=PEEK(88)+
256*PEEK(89):BTS=RTOP-BASE:HI=INT(BTS/
256):LO=BTS-(HI*256)
11ØØ POKE 85Ø,11:POKE 852,PEEK(88):POK
E 853,PEEK(89):POKE 856,LO:POKE 857,HI
111Ø DUM=USR(ADR("hhh*LVd"),16):CLOSE
#N1:REM * AND d inverse
112Ø TRAP 4ØØØØ:GOTO 4Ø
113Ø TRAP 113Ø:? CHR$(125);"LOAD FROM
WHICH FILE (E FOR MENU";:INPUT FILE$
114Ø IF FILE$(1,1)="E" THEN TRAP 4ØØØØ
:GOTO 4Ø
115Ø OPEN #N1,4,128,FILE$
117Ø POKE 85Ø,7:POKE 852,PEEK(88):POKE
 853,PEEK(89):POKE 856,NOKEY:POKE 857,
NOKEY
118Ø DUM=USR(ADR("hhh*LVd"),16):CLOSE
#N1:REM * AND d inverse
119Ø TRAP 4ØØØØ:GOTO 4Ø
12ØØ ? CHR$(125);"DO YOU WANT TO SAVE
THIS IMAGE FIRST?":OPEN #N2,4,NØ,"K:":
GET #N2,A
121Ø IF CHR$(A)<>"Y" AND CHR$(A)<>"N"
THEN CLOSE #N2:GOTO 12ØØ
122Ø IF CHR$(A)="Y" THEN GOSUB 1Ø7Ø
123Ø IF OPT=47 THEN END
124Ø IF OPT=35 THEN RUN
125Ø COLOR C:FOR X2=NØ TO 79:PLOT X2,N
Ø:DRAWTO X2,YMAX:NEXT X2:GOTO 4Ø
126Ø REM *** MODE SELECTION ***
127Ø ? CHR$(125)
128Ø ? :? "PLEASE SELECT A GRAPHICS MO
DE:"
129Ø ? :? "1  MODE 9▶16 SHADES OF ONE
HUE"
13ØØ ? :? "2  MODE 1Ø▶9 HUE/SHADE COMB
INATIONS"
131Ø ? :? "3  MODE 11▶16 HUES OF ONE S
HADE":?
1315 ? :? "    DO NOT PRESS RETURN"
132Ø OPEN #N2,4,NØ,"K:":GET #N2,A
133Ø CLOSE #N2:ON A-48 GOTO 134Ø,137Ø,
146Ø
134Ø MODE=9:? CHR$(125);"GRAPHICS MODE
 9 GIVES YOU 16 SHADES OF ANY ONE HUE.
"
135Ø ? :? "WHAT BACKGROUND COLOR WOULD
 YOU LIKE  TO USE(Ø-15)";:INPUT BKGND
:GRAPHICS 8:POKE 752,1
136Ø POKE 623,64:POKE 87,MODE:BMIN=N1:
BMAX=31:CMAX=15:SETCOLOR 4,BKGND,NØ:GO
SUB 16ØØ:B=N1:GOTO SETUP
137Ø MODE=1Ø:? CHR$(125);"GRAPHICS MOD
E 1Ø GIVES YOU YOUR CHOICE OF ANY 9 HU
E/SHADE COMBINATIONS.":?
138Ø FOR Q=NØ TO 8
139Ø POSITION N2,15:? "COLOR #";Q;" HU
E,SHADE(Ø-15)        ◀◀◀◀◀◀";:INPUT H,L
14ØØ IF H<NØ OR H>15 OR L<NØ OR L>15 T
HEN 139Ø
141Ø C(Q)=H*16+L:NEXT Q
142Ø BMIN=9:BMAX=25:CMAX=8:GRAPHICS 8:
POKE 623,128:POKE 87,MODE:FOR Q=7Ø4 TO
 712:POKE Q,C(Q-7Ø4):NEXT Q
143Ø POKE 752,1:GOSUB 16ØØ
145Ø B=BMIN:GOTO SETUP
146Ø MODE=11:? CHR$(125);"GRAPHICS MOD
E 11 GIVES YOU 16 HUES OF ANY ONE SHAD
E.":?
147Ø ? :? "WHAT SHADE(Ø-15) WOULD YOU
LIKE";:INPUT SHD
148Ø GRAPHICS 8:POKE 752,1:POKE 623,19
2:POKE 87,MODE:GOSUB 16ØØ:SETCOLOR 4,N
Ø,SHD:BMIN=N1:BMAX=31:CMAX=15:B=N1
```

continued on next page

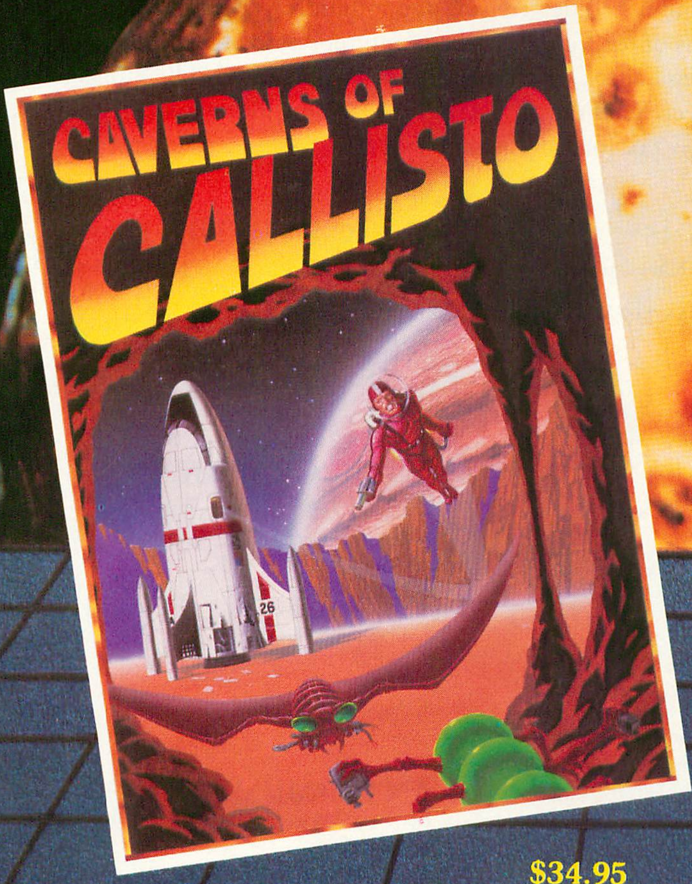
```
1490 C=CMIN:COLOR C:FOR I=BAR(BMIN) TO BAR(BMAX) STEP 4:FOR J=0 TO 3:PLOT I+J,150:DRAWTO I+J,159:NEXT J
1500 C=C+N1:COLOR C:NEXT I:C=CMIN
1510 COLOR C:XP=39:YP=79:COLOR ABS(C-CMAX):PLOT BAR(BMIN),159:DRAWTO BAR(BMIN+N1),159:RETURN
1520 POKE 559,0
1530 DIM XD(15),YD(15),BAR(32),C(8),CHOICE$(80),CHOICE1$(40),FILE$(20),BUFFER$(400),GREY$(32),GRAY(3,15)
1540 CMIN=N0:N0=0:N1=1:N2=2:XMAX=79:YMAX=149:SCALE=0.275:SETUP=1490:JOYSTICK=370:KEY=764:NOKEY=255
1550 FOR Q=1 TO 15:READ N:XD(Q)=N:READ N:YD(Q)=N:NEXT Q
1560 DATA 0,0,0,0,0,0,0,0,1,1,1,-1,1,0,0,0,-1,1,-1,-1,-1,0,0,0,0,1,0,-1,0,0
1570 FOR Q=1 TO 32:READ N:BAR(Q)=N:NEXT Q
1580 DATA 8,11,12,15,16,19,20,23,24,27,28,31,32,35,36,39,40,43,44,47,48,51,52,55,56,59,60,63,64,67,68,71
1590 CHOICE$="Point, Line, Doodle, Box, Circle, Fill,Whole screen, Save, Retreive"
1591 CHOICE1$="   Hardcopy,  New, Quit":POKE 559,34:RETURN :REM Use INVERSE to begin each word
1600 DL=PEEK(560)+256*PEEK(561)
1610 POKE 559,0
1620 POKE DL+166,143
1630 POKE 513,6:POKE 512,0
1640 FOR I=1536 TO 1546
1650 READ A:POKE I,A:NEXT I
1660 DATA 72,169,0,141,10,212,141,27,208,104,64
1670 POKE 54286,192
1680 POKE 559,34:RETURN
30000 ? CHR$(125);"Random or Patterned?(esc to exit)"
30010 OPEN #3,4,0,"K:":GET #3,A:CLOSE #3:IF A=ASC("P") THEN GOTO 30230
30020 IF A=27 THEN GOTO 40
30030 TRAP 30210
30040 OPEN #7,8,0,"P:"
30050 FOR Y=0 TO 15:FOR X=0 TO 3
30060 READ Q:GRAY(X,Y)=Q
30070 NEXT X:NEXT Y
30080 DATA 255,255,255,255,254,253,251,247
30090 DATA 254,222,253,219,222,219,187,183
30100 DATA 222,181,213,183,181,213,244,173
30110 DATA 181,177,213,149,177,149,212,165
30120 DATA 177,145,149,84,145,148,84,161
30130 DATA 145,33,148,68,33,36,68,72
30140 DATA 33;1,36,8,1,4,16,64
30150 DATA 0,4,0,64,0,0,0,0
30160 BUFFER$(1)="[ESC]":BUFFER$(2)="K":BUFFER$(3)=CHR$(128):BUFFER$(4)=CHR$(1)
30170 ? #7:? #7:? #7;CHR$(27);"A";CHR$(8)
30180 FOR X=79 TO 0 STEP -1:P=5:FOR Y=0 TO 191:LOCATE X,Y,A:BUFFER$(P)=CHR$(GRAY(INT(RND(0)*4),A))
30190 BUFFER$(P+1)=CHR$(GRAY(INT(RND(0)*4),A)):P=P+2:NEXT Y
30200 ? #7;"     ";BUFFER$:NEXT X
30210 TRAP 40000:GOTO 40
30220 REM GR. 9 DUMP PROGRAM FOR MX80 BY RON MILLER, SAN DIEGO ACE
30230 TRAP 30330:RESTORE 30250:OPEN #7,8,0,"P:"
30240 FOR I=1 TO 32:READ A:GREY$(I,I)=CHR$(A):NEXT I:REM Set grey scale
30250 DATA 255,255,251,223,251,222,206,183
30260 DATA 219,78,221,70,217,70,248,85
30270 DATA 38,153,36,153,36,145,17,72
30280 DATA 4,65,4,32,0,16,0,0
30290 BUFFER$(1)=CHR$(27):BUFFER$(2)="K":BUFFER$(3)=CHR$(128):BUFFER$(4)=CHR$(1):REM Tell Epson 384 dots coming
30300 PRINT #7:PRINT #7:PRINT #7;CHR$(27);"A";CHR$(8):REM set Epson for 8 dots/line
30310 FOR X=79 TO 0 STEP -1:P=5:FOR Y=0 TO 191:LOCATE X,Y,A:PTR=A+A+1:BUFFER$(P)=GREY$(PTR,PTR+1):P=P+2:NEXT Y
30320 PRINT #7;"     ";BUFFER$:NEXT X
30330 RETURN
```

TYPO TABLE

Variable checksum = 4166571

Line num range	Code	Length
7 - 100	NG	399
110 - 210	BY	373
214 - 310	HN	316
320 - 430	LE	321
440 - 550	SP	364
560 - 655	NS	468
656 - 760	HQ	361
770 - 880	CY	501
890 - 1000	ZX	514
1010 - 1100	HX	557
1110 - 1210	OL	502
1220 - 1320	HN	388
1330 - 1390	BD	507
1400 - 1490	LC	572
1500 - 1570	VS	537
1580 - 1680	YK	523
30000 - 30110	SK	425
30120 - 30220	UD	553
30230 - 30310	YO	582
30320 - 30330	JH	39

Two Great Games From Out of This World!

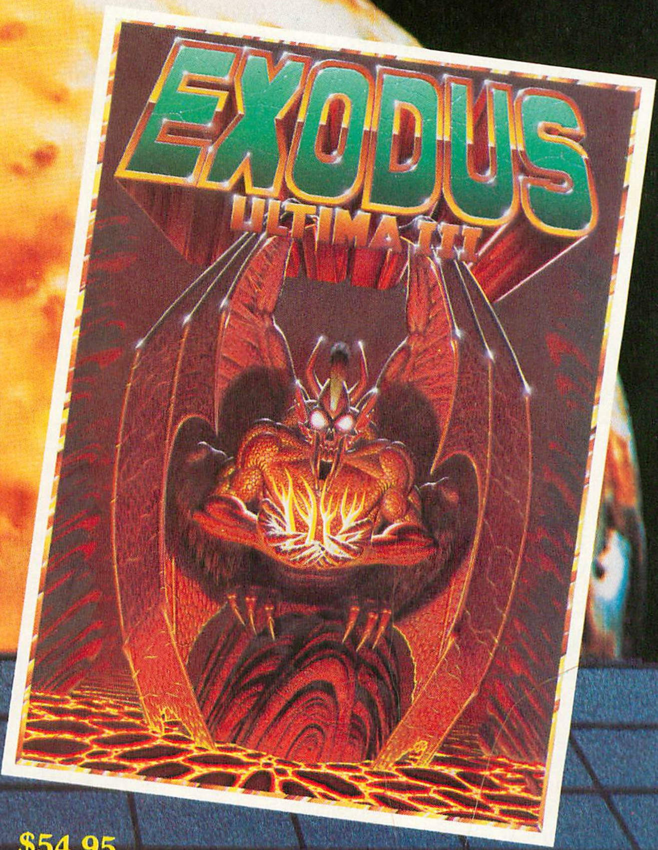


$34.95

CREATED BY CHUCKLES

From the depths of Callisto, Origin brings you the excitement of arcade action with the intrigue of adventure gaming. Real time vertical and horizontal scrolling, along with expert color graphics, offer a truly unique entertainment experience. Chuckles has created five levels of caverns filled with treacherous monsters, boiling volcanoes, and secret passages that will challenge even the most experienced player.

Available for Apple II/II+/IIe and for Atari 400/800



$54.95

CREATED BY LORD BRITISH

From the land of Sosaria, EXODUS: ULTIMA III sets a new standard for excellence in fantasy role-playing games. Continuing the tradition of innovation established by Lord British, EXODUS features new animated graphic techniques, full sound effects, and mult-character interplay. Step into our new fantasy world and use your skill and wit to find and destroy the insidious EXODUS!

MOCKINGBOARD ENHANCED

from your local dealer or direct from:

ORIGIN SYSTEMS INC.

18100 Upper Bay Road, Suite 202
P.O. Box 58009
Houston, Texas 77258
(713) 333-2539

ORIGIN SYSTEMS - ORIGINATORS OF EXCELLENCE

PUBLIC DOMAIN SOFTWARE

ANTIC is pleased to offer a library of Public Domain Software for the ATARI computers currently comprised of 12 disks.These programs are not yet available on cassette. These disks contain unprotected material from the libraries of ATARI users' groups from around the country.

The potential buyer should note that these programs are sold *as is*. Their usefulness may depend on your experience with the computer. They may contain programming quirks that require some modification. However, all perform reasonably well. Contents of the disks may vary slightly from the published description due to unforeseen circumstances, but each disk is filled to reasonable capacity with useful programs of the kind described, and represent an excellent value at $10.00 each, plus $1.50 per order for shipping/handling. Send check or money order (payable to ANTIC Publishing), and disk number(s) to: **Public Domain Software, 600 18th Street, San Francisco, CA 94107.** Allow four weeks for delivery. All orders are sent by First-Class Mail. Please add 6½% sales tax for California residents.

ANTIC GAMES DISK #1

1. Chicken: a great game from ANTIC V.1, No.1
2. Hangman: the traditional word game
3. Creation: a version of Life
4. Reverse: order of string numbers
5. Monopoly: computerized!
6. Lunar lander: select terrain (stick)
7. Zonex: hidden color patterns in grid
8. Clewso: detective adventure, graphics

ANTIC GAMES DISK #2

1. Speed Demon: from ANTIC V.1 No.4
2. Guy' Grid Game
3. Deathstar: from ANTIC V.1, No.2
4. Blackjack: Vegas rules
5. Civil War: a strategic simulation
6. Artillery: firing strategy game
7. Super Wumpus: text adventure

ANTIC GAMES DISK #3

1. Petals
2. Showdown
3. FROG: from ANTIC V.1, No.3
4. Draw: Guy Hurt
5. Plus Zero
6. Collisi, and more

ANTIC GAMES DISK #4

1. Vultures: from Stan Ockers
2. Castle Hexagon: also by Stan Ockers
3. Adventure: The remainder of the disk contains an adventure game program which you can play, or you can use the program to write your own adventure. Instructions included in program.

ANTIC GAMES #5

1. Bats: who else? Stan Ockers, from ANTIC V.1, No.5
2. Steller Defense: from ANTIC V.1, No.6, slightly improved.
3. Yahtzee
4. Mastermind
5. Hamurabi: the classic simulation
6. Slalom: become a master schusser
7. Couch: analyze yourself
8. Aceyducy & more

ANTIC PHOTO GRAPHICS

Digitized Photos

ANTIC UTILITY DISK #1

1. Doc: program allows you to accompany programs with separate documentation on disk
2. Microassembler: allows you to create USR routines-assembler, more
3. Assembler-Editor: BASIC, slow but versatile
4. Num: automatic line numbering utility in BASIC
5. Memtest: runs without BASIC cartridge, to test all memory
6. Color: 128 colors at once
7. Printnop: connect parallel printer from jacks 3 & 4

ANTIC UTILITIES DISK #2

1. Bubble Sort: from ANTIC V.1, No.4
2. Typo: from ANTIC V.1, No.3
3. Home inventory
4. KEY 6: Cipher coding
5. Renumber
6. Compare: listings for differences
7. SUPER: menu
8. Modem
9. RT clock & more

ANTIC UTILITIES DISK #3

1. Disassembler: from ANTIC V.2, No.1
2. Tiny Text: from ANTIC V.1, No.6
3. GTIA text window: from ANTIC V.2, No.1
4. Label: disk label on Epson
5. Set up printer: sets up MX80 for Visicalc
6. Keyboard: tutorial & more

ANTIC GRAPHICS DEMO #1

1. Spider: from ANTIC V.1, No.3
2. Rainbow
3. Horses
4. ATARI logo
5. Oxygen
6. Spiral
7. Pretty
8. Message and more

ANTIC MUSIC DISK #1

Requires Music Composer Cartridge

1. Prelude
2. Joplin
3. In My Life
4. Star Trek
5. Daisy
6. Greensleeves
7. Yellow Submarine, and many more

ANTIC GR. & SO. DEMO #1

1. Graphic
2. Draw
3. Rainbow
4. Tune Rite
5. Etch Sketch
6. Baby Pro Sound and more

ANTIC presents these programs in diskette form for the convenience of the ATARI community, in the belief that all of the programs offered are in the Public Domain and that no proprietary interests or rights to these programs are claimed by anyone. These diskettes are not copyprotected, nor does ANTIC claim rights to the programs themselves. The price of the diskettes is based on the cost of making them available.

Turn your Atari into a Ferrari.

Introducing the all-new 1984 Indus GT™ disk drive. The most advanced, most complete, most handsome disk drive in the world.

A flick of its "Power" switch can turn your Atari into a Ferrari.

Looks like a Ferrari.
The Indus GT is only 2.65" high. But under its front-loading front end is slimline engineering with a distinctive European-Gran flair.

Touch its LED-lit CommandPost™ function control AccuTouch™ buttons. Marvel at how responsive it makes every Atari home computer.

Drives like a Rolls.
Nestled into its soundproofed chassis is the quietest and most powerful disk drive power system money can buy. At top speed, it's virtually unhearable. Whisper quiet.

Flat out, the GT will drive your Atari track-to-track 0-39 in less than one second. And when you shift into SynchroMesh DataTransfer,™ you'll increase your Atari's baud rate an incredible 400%. (Faster than any other Atari system drive.)

And, included as standard equipment, each comes with the exclusive GT DrivingSystem™ of software programs. World-class word processing is a breeze with the GT Estate WordProcessor.™ And your dealer will describe the two additional programs that allow GT owners to accelerate their computer driving skills.

Also, the 1984 Indus GT is covered with the GT PortaCase.™ A stylish case that conveniently doubles as a 80-disk storage file.

Parks like a Beetle.
The GT's small, sleek, condensed size makes it easy to park.

And its low $449 price makes it easy to buy.

So see and test drive the incredible new 1984 Indus GT at your nearest computer dealer soon.

The drive will be well worth it.



INDUS™

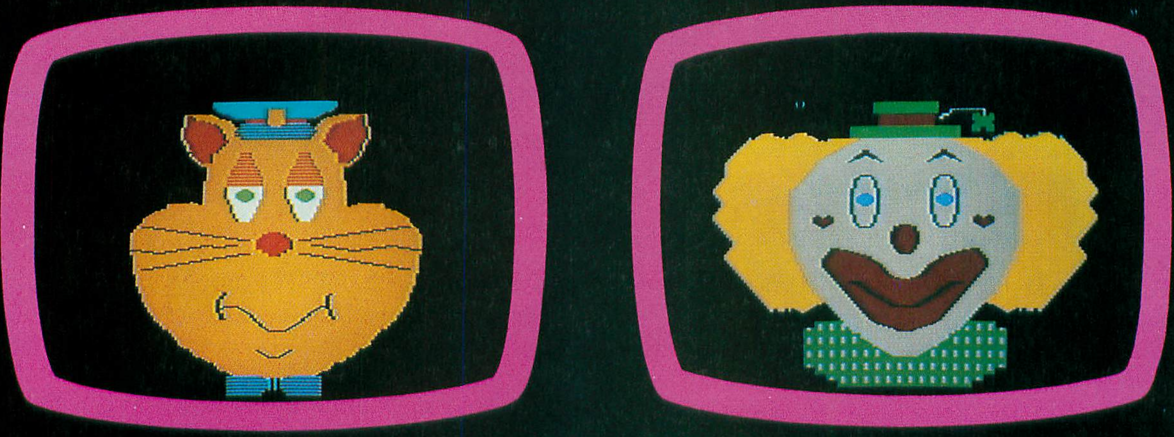
The all-new 1984 Indus GT Disk Drive.

The most advanced, most handsome disk drive in the world.



For additional information, call 1-800-33-INDUS. In California, call 1-800-54-INDUS. 213/882-9600.

SOFTWARE MOVIES™



NEW!

SOFTWARE DESIGNS FOR DEVELOPING YOUNG MINDS™

MAXIMUS, Inc. is excited to present two new educational software movies for kids of all ages . . . and more are on the way!

STORYLINE™ makes bedtime, or anytime, a warm and friendly funtime. Clover the Clown is your tourguide for two fairytales: The Ugly Duckling and Rumpelstiltskin. Through computer magic you become a part of each story!

SAFETYLINE™ combines fun with important lessons about safety. Max the Cat shows you how to cross the street safely going to school and what to do when lost at the zoo.

Both software movies have interactive games that reinforce the fun and learning. Both have real human voices; you don't need a voice synthesizer!

Features of the software include:

- Sophisticated Face Animation
- Lip-Synchronized Voices
- Original Musical Scores
- Superior Full-Color Graphics
- Optional Joystick Control
- Machine Language Programs

Relax and enjoy yourself. Let Max, Clover, and their colorful friends guide you through a new world of fun and learning. You'll be amazed at how real they are!

STORYLINE™ and SAFETYLINE™ are currently available for any Atari computer with 48K. Each software movie comes in either CASSETTE ONLY ($29.95) or CASSETTE/DISK ($34.95) versions. Order by mail or phone. Visa and Mastercard welcome. Include $2.50 postage and handling; Virginia residents add 4% sales tax. Dealer inquiries invited. Write for our free catalog. MAXIMUS, Inc., 6723 Whittier Avenue, McLean, Virginia 22101.

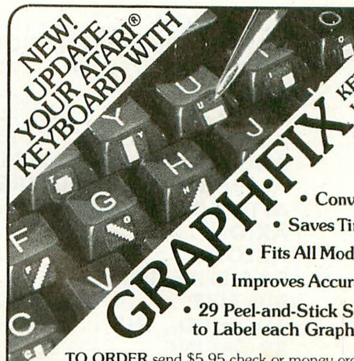
ORDER TOLL-FREE 1-800-368-2152

MAXIMUS ...*Where Excellence is the Standard*

Adventureline™ Series Coming Soon

SHOPPER'S GUIDE

YOUR AD COULD APPEAR HERE



- Convenient
- Saves Time
- Fits All Models
- Improves Accuracy
- 29 Peel-and-Stick Symbols to Label each Graphics Key

TO ORDER send $5.95 check or money order (Texas residents add 5% sales tax) to:

DOVESTAR CREATIVE CONCEPTS
P. O. Box 2109, Dept. 1123, Nederland, Texas 77627
(409) 727-5978 (no collect calls, please) or:
MASTERCARD and VISA customers call Toll-Free Monday-Friday 9 a.m.-5 p.m. Central Time Zone — 1-800-531-7383 (In Texas 1-800-292-5098).
After dialing, get a second dial tone, WAIT for operator and ask for "EXPRESS NUMBER 1037"

DEALER INQUIRIES RECOMMENDED!
Atari TM of Atari, Inc.

GIVE YOURSELF ONE FOR CHRISTMAS!

MEMORY EXPANSION BOARDS for ATARI* COMPUTERS

Christmas Specials

Tiny Tek, Inc. Memory Boards are fully assembled, tested, and guaranteed.

48K/52K Memory Board For ATARI* 400, 52K Addressable Memory, Easy to Install	$99.95
32K Memory Board For ATARI* 400 or 800	$69.95
16K Memory Board For ATARI* 800	$49.95

BUILD YOUR OWN MEMORY

48K/52K Board (No Components)	$30.00
32K Board (No Components)	$25.00
16K Board (No Components)	$10.00
48K/52K Complete Kit	$85.00
32K Complete Kit	$55.00
16K Complete Kit	$35.00

Add $2 Shipping & Handling
Visa & MasterCard Accepted
*ATARI is a trademark of Atari Inc.
Dealer Inquiries Welcome

Tiny Tek, Inc.
P.O. Box 12609 • Dallas, TX 75225
214-373-8926



GO CAMPING
WITH ATARI® THIS SUMMER AND GET PAID!
ATARI COMPUTER CAMPS
needs computer knowledgeable

- Classroom Teachers • On-Site Experts
- Teaching Assistants/Counselors

Send us your resume TODAY!

ATARI COMPUTER CAMPS
ATARI COMPUTER CAMPS
Dept AN
1399 Moffett Park Dr
Sunnyvale, CA 94088
Attn. Pat Tubbs

"Beautiful locations all across the Country"

800XL IS A TRADEMARK OF ATARI INC. ©1983 ATARI INC. ALL RIGHTS RESERVED
AN EQUAL OPPORTUNITY EMPLOYER M F H V. A WARNER COMMUNICATIONS CO

An indispensible tool for your 400/800

OMNIMON!

Incomparable power & convenience!

Complete system control - Resident: Uses no memory but always available! Recover from lockup - Flexible disk I/O Single or double density - Load file w/o DOS - Edit raw sector data - Dump any program to disk - Supports Happy! Many debugging tools - Very user friendly

Price: $99.95 Check or MO

Dealer/Distributor inquiries solicited

Credit Card or COD: (800) 227-3800 ext 561

CDY Consulting
421 Hanbee
Richardson, TX
75080-214-235-2146

VIDEO EXPANDER
for the
ATARI 400*

Now you can enjoy all the benifits of using a color monitor. You get a composite video port and audio output for $39.95, add $2.00 for shipping. For NJ residents add 6% tax.

STARPHIRE ELEC.
P.O. Box 1246
Hightstown, NJ.
08520

*ATARI-400 is a TM of ATARI INC

RATED X

XBASIC by George Schwenk

An extension of ATARI® BASIC, **XBASIC** provides 30 new functions, including:

- **Integer and String Arrays**
- **Player Missile Graphics**
- **Special Graphics Modes**
- **Vertical Blank Sound**
- **Requires less than 3 K RAM**
- **Detailed Manual / 6 Examples**

All this power for only **$29.95**, plus $2.00 shipping and handling. Order now from SUPERware, specify disk or cassette, MC, VISA, AMX, check, M.O.

SUPERware
2028 Kingshouse Rd.
Silver Spring, MD 20904
(301) 236-4459

Dealer Inquiries Invited.

NEW!

Wizard Ware

EDUCATION • GAMES • APPLICATIONS

ZERO ZONE: Maneuver your ship and try to blast through the force shield of the city of Zone. But watch out for the cities' mountain side cannons which are trying to blast you out of the sky with radioactive missiles. Super arcade sound, graphics and action. 100% machine language. 32K DISK TAPE

Price $14.95

COPY PERFECT: A quality disk reproduction system. Will duplicate entire disk in only 2 passes vs. 3 passes in other systems. Copy Perfect is especially designed to copy autoboot/file oriented disks and damaged sectors. Supports multiple drives. Other special features. 100% machine language 48K DISK.

Price $14.95

All software has full lifetime warranty against defects.

Send for free software catalog
To order call or write to:

PH. (919) 851-9314

Wizard Ware
P.O. Box 37093
Raleigh, N.C. 27627

ADVERTISERS

This list is provided as a convenience and as a courtesy to advertisers. ANTIC does not guarantee accuracy or comprehensiveness.



It's Dandy!

Battling Borkons? Boring. *Chicken Challenge?* Cliché. Distinctive and different is **DANDY,** the great new team game from the ATARI Program Exchange. **DANDY** lets you:

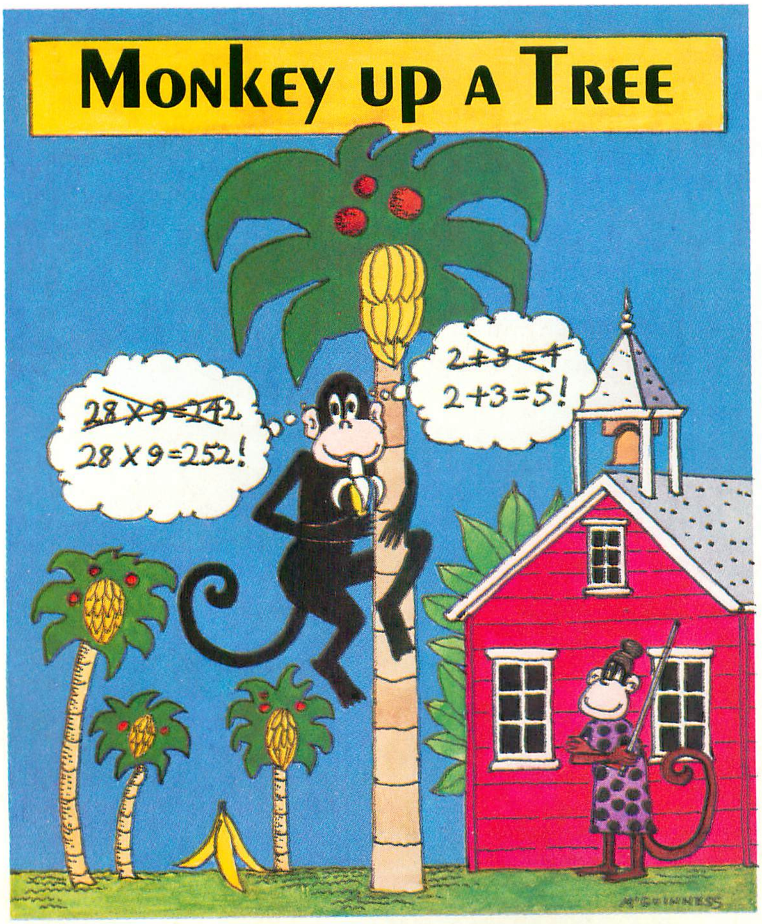
- **Explore a 26-level dungeon!**
- **Bring up to three friends!**
- **Work as a team to battle monsters!**
- **Gather untold riches!**
- **Create new dungeons to challenge your friends!!!**

Kiss *Killer Koalas* goodbye. It's time to conquer a new world.

Ask for **DANDY** at your local ATARI software retailer, or order direct. Phone 800-538-1862, or 800-672-1850 in California. Or write ATARI Program Exchange, P.O. Box 3705, Santa Clara, CA. 95055.

Diskette APX-20210 $29.95
For direct orders, add $2.50.
(Requires joystick controller/s)





Arithmetic driving you bananas?

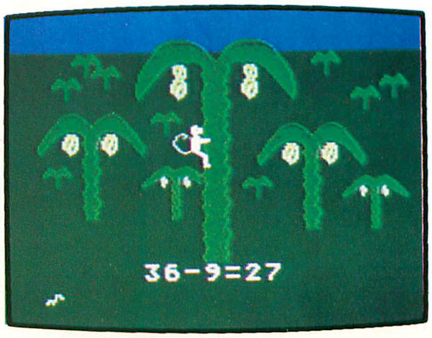
Monkey around!

Let Merle the monkey show you that learning is fun! With the right answer, Merle gets closer to lunch, and the next problem is a little harder. When two play, the game automatically adjusts to the skill level of each player. Bright colors and sound effects add to the learning fun!

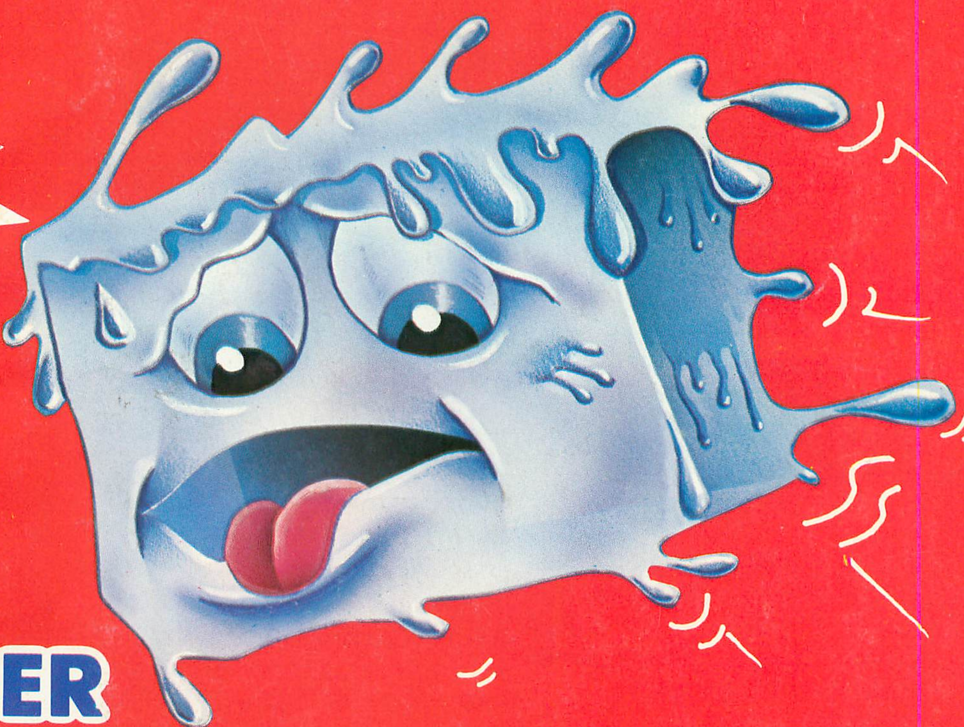
Ask for **MONKEY UP A TREE** at your local Atari software retailer, or order direct. Phone 800-538-1862, or 800-672-1850 in California. Or write ATARI Program Exchange, P.O. Box 3705, Santa Clara, CA. 95055.

Cassette	APX-10165	$24.95
Diskette	APX-20165	$24.95

For direct orders, add $2.50.

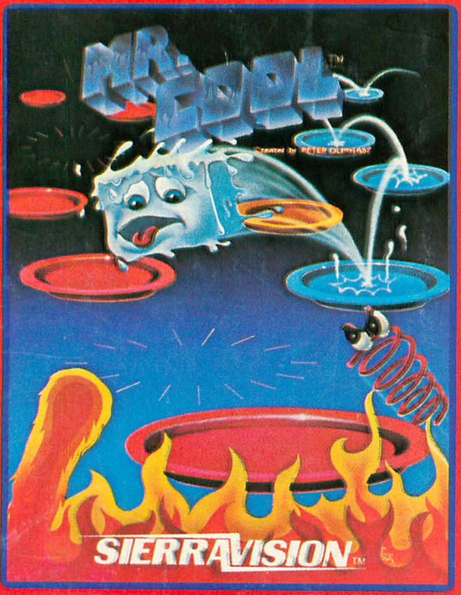


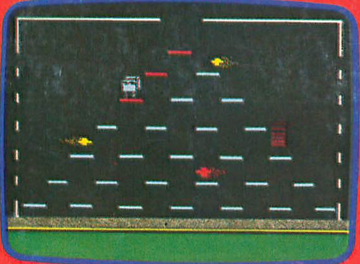
BUY 2 SIERRAVISION PRODUCTS GET 1 FREE

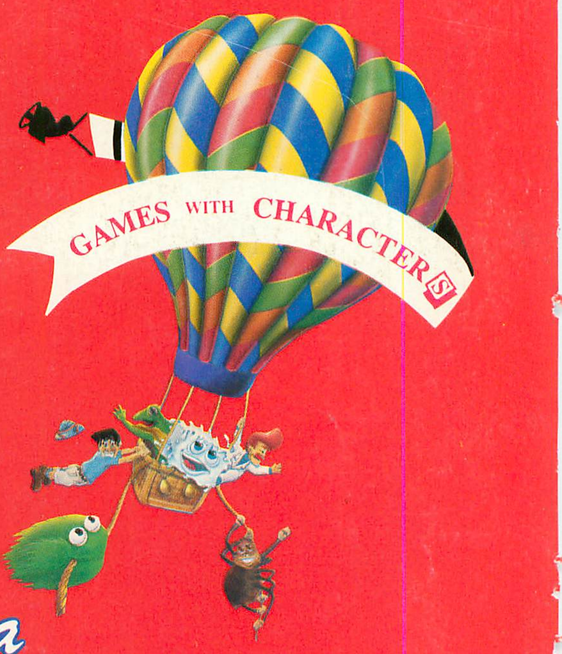


BOIL OVER WITH MR. COOL!

The ice cube cometh - Mr. Cool, the hottest star to ever bounce around the pyro-pyramid. Flaming fireballs blaze a menacing trail as Mr. Cool chills the 28 plates in the pyro-pyramid. Hot springs follow his every move through the inferno. One touch by either and he's just another puddle. It takes quick flicks of your wrist and a touch of SuperCool to survive. Join Mr. Cool in fast-paced action that will have you bubbling over with excitement!







Sierra ON-LINE™

SIERRA ON-LINE BUILDING COARSEGOLD CA 93614
209 683 6858

APPLE • ATARI • COM 64 • IBM